ugust 1960

Tunnel Work
What's being done
—and how

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drafting room

p. 3

STRUCTURES



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STRUCTURES

AUGUST

1960 • Vol. 56, No. 8

Tunnel work—An RT&S staff report

- Why tunnels are a problem today 21

 Explains the reasons behind the sudden increase in the amount of tunnel work underway around the country.
- What's being done—and how

 Outlines the problems being encountered and describes, both generally and specifically, some of the methods in use for solving them.
- Repairing an old brick lining

 Describes and illustrates how the Erie is repairing and waterproofing the unlined and lined sections in its mile-long Otisville tunnel.
- Advanced features for big, new freighthouse

 Structure on Burlington has unbroken roof slopes, prestressed floor slabs in office portion, other modern features.
- How M/W supervisors are selected and trained

 Tells what a number of roads are doing to assure themselves of a supply of supervisory talent and how they are training the men selected.

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■ Don't miss . . .

Last March test sections of prestressed concrete ties were installed in main lines of the SAL and ACL. A progress report will give the results of field inspections and tell how the ties are performing in service.

... in the September issue



FAIRMONT

Now one man spot-tamps faster than four men

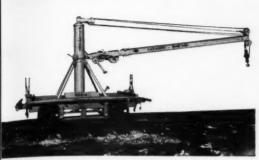
Here's how you can raise 25 to 30 rail joints an hour and still free three men of a four-man section gang for other jobs! The answer—a Fairmont W99 Series B Spot Tamper. One man rides in the center of the self-propelled W99 and hydraulically controls all four air tools to raise low spots, hanging ties and old joint locations at an average rate of 30 to 45 seconds per tie-end. The other men in the gang are free for jacking, sighting, loosening compacted ballast, and dressing.

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set-off, a foreman and two men can remove the We Spot Tamper from the track. And it's light enough to be transported to various locations in stake body and dump trucks.

The air-actuated guns turn on and off automatically as the tamping head is raised and lowered. The W9 has the vertical force for good penetration and a the arrangement for the hinged guns to crowd ballast under the ties. It comes equipped with a foot brake to prevent creeping when spotted over a tie, and a two-wheel drive for better tracking. The W99 is available with or without the tamping guns and compressor. Send for full information today.





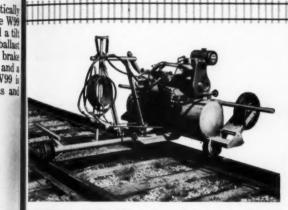
W64 SERIES A DERRICK CAR—One or two men can handle equipment up to 3000 lbs. Can be equipped with either a single or two-line power lift, 13-foot boom: 360° pivot.

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Wa3 SERIES B TIE NIPPER—Simple lever and linkage open and close hooks for fast operation; long handle gives maximum leverage; long wheel base means good tracking.



W72 SERIES A OIL SPRAYER—Compact, efficient unit requiring only a small crew to apply oil to rail joints at a cost of only a few cents each. Easy to remove from track.



W71 SERIES A TIE SPRAYER—One man can apply heated protective coating to newly adzed tie surfaces when re-laying rail. Spray operation is automatic as the unit is pushed.

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INCREASED OPERATOR EFFICIENCY. The new two-jack hydraulic steering system makes the 619B extremely easy to maneuver, yet retains the important feel-of-the-road. The motion-reducing Torsionflex seat is standard on the 619B.

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Advanced design 619B combines two-wheel traction with four-wheel speed and roadability. It results in more cycles a day, stepped-up production and less operator fatigue. And like all Cat equipment, high availability is built into this team. Ask your Caterpillar Dealer to demonstrate it on your right-of-way. See for yourself how the 619B-442B steps up production and cuts costs on the toughest assignments.

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STRUCTURES NEWS NOTES ...

. . a resume of current events throughout the railroad world

A delay of at least six weeks is indicated in management-union discussions of work rules. The carriers' conference committee proposed that meetings be started August 2 but, according to brotherhood sources, the operating unions have rejected that date and won't be ready to talk before September. Prior preliminary discussions had ended abruptly when the railroads rejected a union proposal that a commission be set up to study work rules, wages and other facets of the picture. The carriers contend this approach would not only extend the negotiations but would produce recommendations that would not be binding.

The question of ending the carriage of surface mail by air will be up to the Senate when Congress reconvenes in August. Before adjournment for the national political conventions, the House passed a bill to end the Post Office Department's seven-year-old "experiment." The bill would prohibit air transportation of fourcent mail on routes where surface transportation facilities are adequate.

A decline of \$39 million in net income of Class'I railroads is estimated by the AAR for 1960's first five months, compared with the corresponding 1959 period. The estimate puts this year's five-months' net at \$195 million, compared with \$234 million last year. May's estimated net, at \$47 million, was off \$25 million from May 1959's \$72 million. Twenty-nine Class I roads failed to earn their fixed charges in this year's first five months.

SAL and ACL stockholders will vote on the proposed merger of the two roads at special meetings in Richmond, Va., August 18, according to proxy material mailed in early July. Directors approved the merger plan May 19. The new company would be called the Seaboard Coast Line. The proxy material also indicated that a new \$20-million electronic yard would be built if the proposed consolidation goes through.

A giant railway system of almost 24,000 miles of road would result if the proposed merger of the GN and NP goes through. The plan was approved by the directors of both the NP and GN and will be presented to the stockholders and the ICC for approval by the end of this year. Also involved are the SP&S, which is wholly owned by the GN, and the CB&Q of which 97.18 per cent is jointly owned by the two large roads.

The prestressed-concrete crosstie, now undergoing service tests on the ACL and SAL, has generated interest in the Arab countries. Two officers of the American Concrete Crosstie Corporation, Tampa, Fla., were invited to Egypt to discuss a contract for supplying the United Arab Republic with 8,000,000 such ties over a 25-year period. Douglas P. Cone, president of American Concrete Crosstie, and John P. Roebuck, vice president, are investigating sources of raw materials and plant-construction costs.







J. A. Caywood



J. T. Collinson

BALTIMORE & OHIO-C. Russell Riley, chief engineer, Baltimore, Md., has been promoted to general manager, Eastern Region, with headquarters remaining at Baltimore, succeeding Charles E. Bertrand who has been promoted to vice president-operation and maintenance. Clarence E. Jackman, assistant chief engineer-maintenance (system), also at Baltimore, has been promoted to chief engineer-construction and maintenance there, succeeding Mr. Riley. Mr. Jackman is succeeded by J. A. Caywood, engineer maintenance of way at Baltimore, who is in turn succeeded by J. T. Collinson, division engineer at Baltimore.

BELT OF CHICAGO-H. C. Koch, roadmaster at Chicago, has been promoted to resident

CANADIAN NATIONAL-H. G. Berube has been appointed acting assistant roadmaster at Chambord, Que., succeeding L. Abel. J. W. Lagergren, roadmaster at Warroad. Minn., retired recently after more than 44 vears of service.

CHESAPEAKE & OHIO-Kenneth C. Morriss, assistant division engineer at Ashland, Ky., has been promoted to assistant trainmaster at Clifton Forge, Va. W. T. Davis, office engineer at Richmond, Va., retired recently after 43 years of service. R. L. Milner, transportation assistant at Huntington, W.Va., and an engineer by training and experience, has been promoted to principal transportation assistant there.

CHICAGO & ILLINOIS MIDLAND - H. D. Hohn, assistant to chief engineer, Springfield, Ill., has been promoted to assistant chief engineer there.

COTTON BELT — H. G. Russell and E. L. Former, roadmasters at Tyler, Tex., and Lewisville, Ark., respectively, retired recently, each after 40 years of service.

DENVER & RIO GRANDE WESTERN-The following appointments have been made recently at the locations shown: A. H. Nance to assistant roadmaster at Salida, Colo.; Z. G. Summerfield to assistant roadmaster at Glenwood, Colo.; J. C. Baughman to track supervisor at Glenwood Springs, Colo.; R. E. Davis to track supervisor at Price, Utah; R. C. Oatman to office engineer at Salt Lake City, Utah; and F. L. Bretz to assistant engineer at Salt Lake City.

ERIE—L. M. Swoop, division engineer at Hoboken, N. J., has been promoted to engineer maintenance of way of the Western district at Youngstown, Ohio, succeeding H. J. Weccheider, whose retirement was noted in the July issue. L. R. Henderson, assistant division engineer at Youngstown, has been transferred to Hoboken to succeed E. W. Scott who has been promoted to division engineer there to replace Mr. Swoap.

Stanley M. Bielski, assistant superintendent of construction, Cleveland, Ohio, has been promoted to superintendent of construction there, succeeding A. B. Fowler who has retired, effective June 30, after 41 years of service. Mr. Bielski is succeeded by Donald S. Taylor, assistant to superintendent of construction at Cleveland. The latter position has been abolished.

FRISCO-F. H. Gresham and Hanson Rainwater have been appointed assistant roadmasters at Memphis, Tenn., and Springfield, Mo., respectively.

LOUISVILLE & NASHVILLE-Walter E. Quinn, special engineer, Louisville, Ky., has been promoted to principal assistant engineer there, succeeding Gordon H. Beasley who has retired after 41 years of service.

MILWAUKEE-P. H. Goolhart, assistant engineer at Tacoma, Wash., has been promoted to principal assistant engineer there, succeeding C. H. Tusler whose retirement was announced in the July issue.

The headquarters of Roadmaster K. D. Natzel has been changed from Miles City, Mont., to Roundup, Mont.

NEW HAVEN-Albert E. Cawood, assistant to chief engineer at New Haven, Conn., has been promoted to assistant chief engineer.

NICKEL PLATE-Louis V. Martin has been appointed roadmaster at Charleston, Ill., succeeding David L. Bracken, deceased.

NORTH WESTERN-B. F. McDermott, assistant division engineer at Milwaukee, Wis., has been promoted to division engineer at Norfolk, Neb., succeeding E. L. Hoffman who has retired after 40 years of service. Mr. McDermott is succeeded by M. C. Christensen, formerly assistant engineer at Chicago. Harold L. Keeler, assistant engineer at Boone, Iowa, has been promoted to assistant division engineer there, succeeding L. G. Tleman whose promotion to division engineer was noted in the July issue.

J. A. Barnes, assistant to assistant chief engineer-maintenance, Chicago, has been promoted to assistant engineer of track with headquarters remaining at Chicago.

E. L. Barnes, roadmaster at Antigo, Wis. has been promoted to assistant process engineer at Chicago, succeeding L. J. Schwabe who has retired after 48 years of service, G. H. Clork, roadmaster at Sioux City, Iowa. has been transferred to Spooner, Wis., succeeding C. G. Stockwell who has retired after 48 years of service. C. G. Friets, supervisor bridges and buildings at Escanaba. Mich., retired recently after 48 years of service.

L. B. Lenzen, roadmaster at Tracy, Minn. has been transferred to Sioux City, Iowa Clayton Cockrell, maintenance gang fore-man at Huron, S. D., has been promoted to assistant roadmaster there.

SANTA FE-Ralph Jones, office engineer at Los Angeles, Calif., has been promoted to division engineer at San Francisco, Calif., succeeding Harold R. Hart who retired recently after 43 years of service. Mr. Jones is succeeded by W. W. Toliver, assistant division engineer at Winslow, Ariz., who is in turn succeeded by C. W. Hanson, construction engineer on the Gulf, Colorado & Santa Fe, part of the Santa Fe System.

SOUTHERN PACIFIC — Gerrit P. Nagtegad has been appointed engineer structural design at San Francisco, Calif., succeeding J. F. Hoss, Jr., transferred.

UNION RAILROAD-J. R. Shafer, assistant to chief engineer at East Pittsburgh, Pa. has been promoted to office engineer there, succeeding J. H. Ferguson who has retired after 40 years of service. Mr. Shafer is succeeded by G. E. Fischer, assistant supervisor

Obituary

Frank J. Ackerman, retired chief engineer of the Kansas City Terminal, died on June 17 at the age of 84.

W. F. Baker, 46, roadmaster on the Chicago & North Western at South Pekin, III., gied suddenly on June 23.

Guy P. Palmer, retired regional engineer of the Baltimore & Ohio Chicago Terminal, died on July 16 at the age of 77.

Biographical briefs

Marshall J. Nickerson, 44, who was recently promoted to engineer of construction, Atlantic Region, on the Canadian National at Moncton, N. B. (RT&S, Mar., p. 10), was born at Port Saxon, N. S. Ht entered the service of the CNR in 1951 as an assistant engineer at Moncton, serving also in that capacity at Edmundston, N.B. Mr. Nickerson was promoted to resident

(Continued on page 50)



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A low rate of application effectively destroys weeds and grasses...

prevents regrowth. Easy to apply...nothing to mix...no water to haul.

Nonflammable, noncorrosive, nonpoisonous when used as directed.

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BANTAM's simplified retractable-wheel design provides easy drive-on or drive-off at any rail crossing Special high-speed, full-reversing transmission gives BANTAM equal track speeds both forward and reverse and on the highway it travels permit-free anywhere is work to be done.

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RR associations—An aid to supervisory training

Grade crossing maintenance

A few highway engineers are making it mighty tough for some railroads to maintain railroadhighway grade crossings. They not only specify the exact elevation to which the top of crossing must be raised to meet pavements, but they also insist that the work be done under vehicular traffic. It is the latter stipulation which is not realistic and no doubt is made without the highway engineer being fully aware of railroad prob-

Today, primary roads are six and eight lanes wide. If they cross the railroad at an angle, the length of track to be raised will be considerable. In such cases, when a highway engineer permits only the closing of two lanes at a time, that is all of the track that can be raised at that time.

Raising only a short section of track at a time and still provide run-offs for rail traffic is a very difficult operation if any semblance of smooth track surface is to be the end result. For each small section the foreman must guess how high he should raise the track so that, after trains have passed over it, all of the track through the crossing will have a uniform surface. This borders on the impossible.

Possibly, some highway engineers do not understand the close tolerances to which railroad engineers must work.

For

older

11

Responsible railroad engineering officers should take pains to explain these matters to any highway engineer who insists upon raising crossings under the above conditions. In all likelihood he will revise his thinking and give up at least half a crossing at a time. If not, then the matter should be a point for discussion between the road's engineer of maintenance and top highway engineers.

Agreement apparently is unanimous among M/W officers that supervisory personnel must be chosen with greater care and given better and more thorough training than ever before. This statement is based on observations of an RT&S editor who recently interviewed a number of such officers to determine their viewpoints on this subject. His findings are reported in an article printed on pages 30 and 31 of this issue.

From the article it is apparent that higher M/W officers are backing up their convictions regarding the training of supervisors by putting into effect various types of training programs. However, there is one medium of training that was not mentioned by any of those interviewed. We refer to the role played by the several associations of railway M/W officers and supervisors, namely, the American Railway Engineering Association, the Roadmasters' & Maintenance of Way Association and the American Railway Bridge & Building Association.

Mention of the latter two is particularly appropriate at this time because their annual conventions are only weeks away—September 19-21 to be exact.

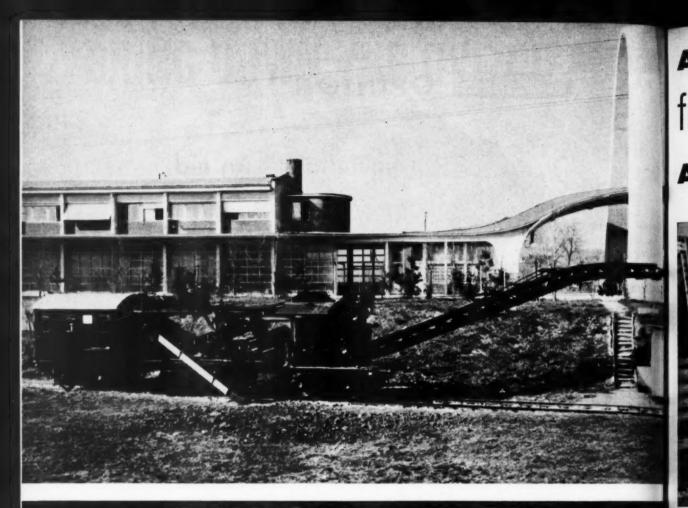
The fact that the men interviewed failed to mention these associations as educational agencies for supervisors was doubtless an oversight. After all, they were being interviewed on what their particular roads were doing, thereby setting up a line of thought that could be assumed to exclude outside agencies.

While most M/W officers probably don't ordinarily think of the Roadmasters' and B&B groups as educational organizations, they would doubtless be quick to agree that this is so. Those who are familiar with the procedure and content of the meetings will note that, in effect, they afford several different types of training. The committee reports, for example, frequently amount to refresher courses in the fundamentals of practice and procedure. Sometimes, on the other hand, they may be likened to advanced courses on recent developments. Or they may be a combination of the two. Special features, such as addresses or panel discussions, are educational in their own way.

Because they serve an educational function, and because the training of supervisors is considered of such prime importance today, the Roadmasters' and B&B Associations are deserving of the active support of top engineering officers. This support can be manifested in two ways: (1) By encouraging subordinates to join and participate actively in the affairs of the associations; and (2) by arranging for as many as possible of them to attend the meetings.

Past experience indicates that such support is usually forthcoming during periods of good business but may be noticeably lukewarm at times when business is not so good. Behind this switch in attitude is a desire to reduce expenses.

On the other hand, can anyone argue seriously with the thesis that sound, competent, well-trained and well-informed supervision is more necessary than ever when there is pressing need to keep expenses to a minimum? Can the money saved by keeping a supervisor home at convention time be said to outweigh the potential value of the knowledge he would gain by attending?



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RAILWAY TRACK and STRUCTURES

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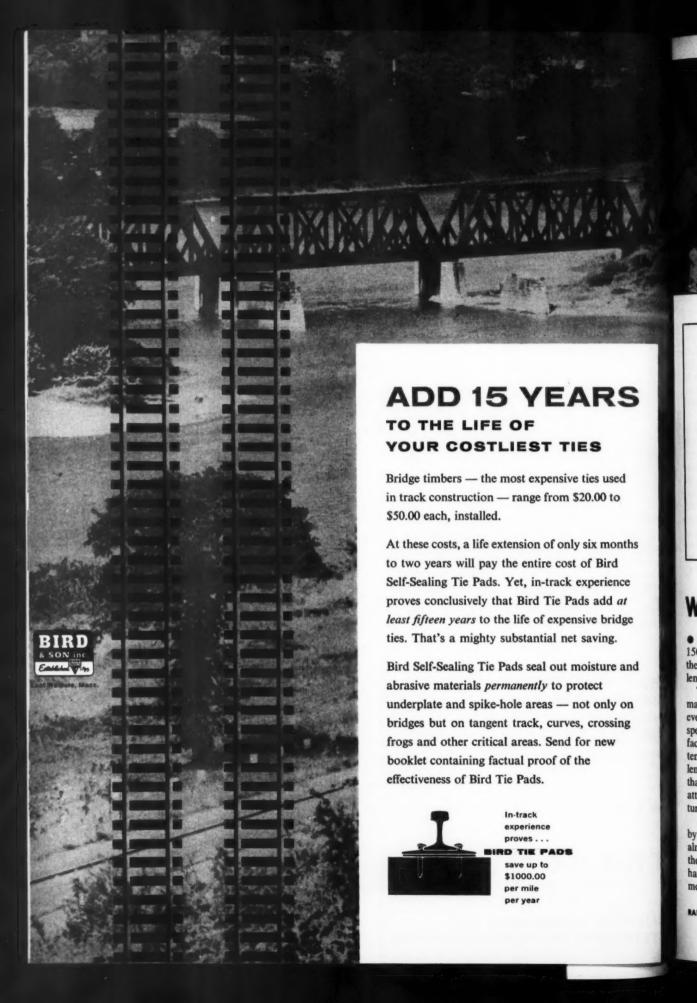
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Tunnel work...

Extensive need for repairs, more clearance spurs activity

An RT&S staff report

Always a problem, railroad tunnels, it appears, are more of a problem now than ever before. There are two primary reasons for this situation.

One is old age. The passage of time brings deterioration in most tunnel linings due to such factors as water, frost and chemical action—and many tunnels have been in service long enough to allow these agencies plenty of time in which to do their work.

Higher loads, primarily due to piggy-

back, comprise the second reason. Many existing tunnels are found to lack the vertical clearance required to handle these loads.

The result is a sudden spurt in the amount of tunnel work underway around the country. This work is in the form of repairs, enlargement and daylighting.

This report outlines the problems being encountered and describes, both generally and specifically, at least some of the methods in use for solving them.

Why tunnels are a problem today

• Estimates are that there are about 1500 railroad tunnels in existence in the United States with an aggregate length of approximately 320 miles.

This statement could have been made five years ago, or ten years, or even fifty or more years. What gives special significance to it today is the fact that the passage of time has intensified tunnel maintenance problems and has brought developments that have had the effect of focusing attention on the restrictive nature of

Evidence of the damage wrought by the passage of time can be seen in almost any of the older tunnels-and there are plenty of them. Tunnels that have been in existence 50 years or more are not uncommon, and there are some whose age ranges well up toward the century mark.

Whether the lining is masonry, timber or natural rock there is a certain amount of normal deterioration that takes place with advancing age. To this factor in many tunnels must be added the great enemy of tunnel linings and economical tunnel maintenance-water, especially if it is gaining access to the tunnel through cracks or faulty joints in the masonry. Along with its detrimental effect on tunnel linings, excessive water in tunnels results in the added expense and aggravations associated with muddy track, as well as hazardous ice conditions in cold weather.

Because tunnel work is expensive there appears to be a natural tendency to postpone it as long as possible. But there comes a time when, in the interests of safety and ultimate economy, further delay is no longer possible. Indications are that this point has been reached in many tunnels and is rapidly approaching in others. Result: An upsurge in the amount of tunnel repair work in progress or in prospect for the near future.

But the need for lining repairs isn't the only factor in the tunnel picture today; the rapid growth of piggyback traffic and its introduction on new territories has found some roads with tunnels having insufficient clearance for this type of traffic. In some few instances the single-tracking of double-track tunnels has taken care of the problem. In the absence of such a fortuitous circumstance there is no alternative but to undertake major surgery on the tunnel itself.

Tunnel work cont'd

What's being done-and how

● The tunnel work in progress today can be divided into two broad categories: That required because of the need for repairs and that brought about by the need for greater clearances.

In either case the problem may be solved by "daylighting" the tunnel, in whole or in part. The decision whether to adopt this expedient or to repair or enlarge the tunnel, as the case may be, is simply a matter of economics, weighing the cost of one against the other and not overlooking future maintenance costs if the tunnel should remain in existence. With the grading equipment now at their disposal, and in view of modern blasting techniques and equipment, engineers find it much easier to justify daylighting than in past years. "Cuts 125 ft deep are nothing," said one engineer as he pondered a serious tunnel problem on his road.

Removing the overburden from a tunnel, especially if it involves blasting, is an operation that requires careful planning and execution. "One bad shot over a tunnel can rupture the lining and bring tons of rock and earth down on the track," said one tunnel engineer. It's for this reason that a shield of metal liner plates is sometimes installed in a tunnel that is slated for daylighting. However, this expedient may be prevented by insufficient clearances in the tunnel.

More often than otherwise, however, there is no alternative but to go into the tunnel and perform whatever work is necessary, whether it is repair of the lining or enlargement of the bore, to obtain greater clearances.

Taking up first the matter of repairs, this is a task that is frequently complicated by the presence of water. Water leakage in tunnels is "one of the most aggravating and difficult problems," declared a subcommittee of the AREA Masonry committee, reporting at this year's convention on the subject, "Leakage in tunnels and methods of correction."

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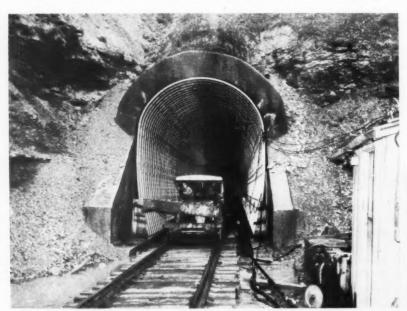
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Commenting on methods of correction in masonry-lined tunnels the sub-committee stated it is "best to bring the water through proper drains into the ditch rather than try to seal the water back of the tunnel lining." If it is not possible to open existing weep holes and drains, new weep holes and drains should be made, it said.

The proper location for drains can be determined, said the subcommittee, by drilling through the tunnel lining at the wet areas to tap the water. Although many of the holes will be dry the wet ones found will make the procedure "well worth while," according to the report. "The holes," it continued, "should be drilled as near the ditch line as practical, depending... on the height of the seepage point, and spaced approximately 10 ft apart or as judgment dictates."

On the matter of sealing joints or cracks, the subcommittee had this to say:

"Construction joints or cracks where seepage is light may be sealed by chipping the crack in the form of a 'V' and caulking with oakum or lead wool, then covering with shotcrete... Where seepage in joints or cracks is too great to seal, or a definite leak occurs, water should be carried in a drain to the ditch line. A series of holes should be



AS INSTALLED the metal lining has a horseshoe shape. Plates rest on concrete footers.

Installing metal liner plates in an old tunnel

The use of metal liner plates in tunnels is illustrated by a project carried out on the Chesapeake & Ohio last year. This job involved the road's 2004-ft Williams Creek tunnel which extends through an Appalachian ridge about eighteen miles from Ashland, Ky. Built in the 1880's the tunnel was lined with brick which, incidentally, was made at the site.

The recent project involved the lining of

406 ft of the tunnel with Armco Tunnel Liner Plate. The portion so lined is in two sections, one 252 ft long and the other is 154 ft in length. Procedure was to assemble the liner plates in half rings outside the tunnel and haul them to the point of use on push cars. In the tunnel the sections were bolted together. They are supported on base angles embedded in concrete footings on each side of the track.



ASSEMBLED half-sections are lifted in

drilled in the drain channel through the tunnel lining to offer an easy path for the escape of water. The face of the drain may be of brick or shotcrete."

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Commenting on the use of pressure grout back of the tunnel lining the report said this procedure may seal some areas that are wet or possibly drive the water to a point of concentration where a drain may be cut. "Pressure grout applied to the lining may fill internal voids in porous concrete or fill channels in brick lining," it continued. "However, deteriorated concrete or brick should be romoved and replaced. The success of grouting is problematical and must often be used in conjunction with other remedies."

In the grouting and shotcreting of masonry tunnel linings, various additives are frequently used to expedite penetration and to halt leakage. The article on page 26 affords an example of the use of waterproofing compounds in the shotcreting of a tunnel on the Erie.

Where unlined sections of tunnels show signs of deterioration, presenting the danger of rock falls, roof bolts are proving to be an effective method of stabilization. Such bolts are inserted in drilled holes and are provided with a means of anchorage at one end and threads at the other, so that a nut and plate washer may be applied.

"The primary effect of roof bolting," explains the Bethlehem Steel Company, "is to consolidate several strata into a thick beam, holding the layers



ROOF BOLTS are inserted in holes made by steper drill, and driven by stoper hammer.



How WP produces concrete for tunnel linings

For use in carrying out an extensive program for replacing timber linings in tunnels with concrete the Western Pacific has devised an equipment combination that it reports is proving successful. The combination, as pictured above, consists of a Bin-an-Batch hopper, a cement mixer and a Pumpcrete machine arranged on two flat cars. With the bins filled with aggregate from stockpiles out-

side the tunnel the flat cars can be moved inside for the mixing and placing of the concrete.

Aggregates are delivered from the batcher to buckets that travel on rails beneath the bins. These buckets dump into the loading bucket of the mixer. A skip loader delivers the wet concrete from mixer to Pumperete machine from which it is pumped into steel forms.



TORQUE wrench being used to test nut on one of the roof bolts. Note use of steel roof ties.

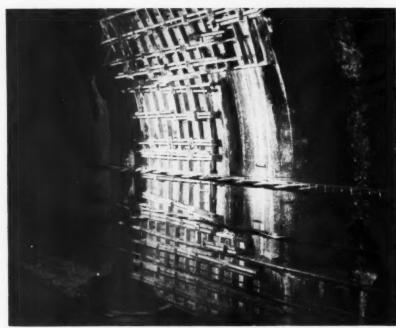
Reading prevents rock falls with roof bolts

The photographs at left and above show the application of roof bolts in a tunnel on the Reading. The road reports they have proved to be an effective and economical means of preventing rock falls.

The Reading's experience is that the bolts have sufficient strength to hold the rock securely when placed on 5-ft centers, although the pattern of application necessarily varies with the type and condition of

the rock to be secured. The company believes that both types of Bethlehem roof bolts are equally effective. One type has a slotted end that fits over a wedge placed in the hole, while the other uses a squarehead bolt with an expansion shell. However, the latter type is preferred by the road for roof work because it requires less exactness in the depth to which the holes are drilled in the rock.

Tunnel work-What's being done cont'd



FORMS are still in place following repair of lining in a busy, double-track subway tunnel.

Restoration by grouting preplaced coarse aggregate

Illustrated in this view is the Intrusion-Prepakt method of restoring deteriorated concrete tunnel linings. In this method the defective concrete is first removed. A form is then erected over the cavity to conform to the original concrete surface. The form is filled with graded coarse aggregate and mortar is pumped into it. Special admixes in the mortar are said to assure a tight bond with the existing concrete.

together as a single beam to prevent sagging In some instances roof bolts act as 'sky hooks,' securing look lower layers to an upper stratum of sandstone or other rock mass."

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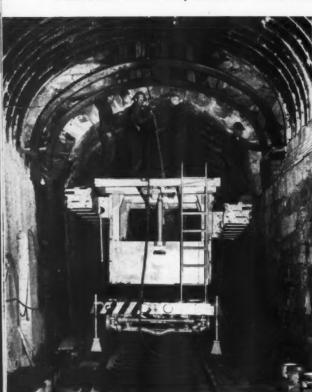
Where conditions indicate a need for shotcreting an unlined tunnel, this procedure is sometimes used in conjunction with roof bolting.

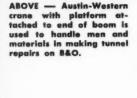
Metal liner plates provide a wellknown and widely used means of correction where existing linings have failed and where the clearances are sufficient to permit their use. Where such plates are used a common procedure is to fill the space between them and the existing lining with grout.

Where space permits, steel sets, made of wide-flanged beams cold formed to the desired contour, may be installed to support a failed lining with or without the benefit of lagging depending on the condition of the lining.

Getting more clearance

When more vertical clearance is needed in a tunnel, and daylighting is not economically justified, the railroad has the choice of enlarging the bore in the roof area or cutting down the floor to lower the tracks. A project carried out in the 1330-ft tunnel of the Milwaukee Road at Tunnel City, Wis,





LEFT - Athey motorizedscaffold unit, as developed in collaboration with B&O engineers, moves on rub-ber tires, has rail guide wheels for on-track use.

B&O launches tunn

Last year the Baltimore & Ohio undertook an extensive tunnel improvement and repair program, particularly on its single track line between Clarksburg, W. Va., and Parkersburg. This territory forms part of the main route between Baltimore and & Louis. The work being done includes both the repair or renewal of arch linings, and the daylighting of some tunnels in their er tirety and portions of others. All of the work is being done by company forces.

Because of the heavy traffic on this line B&O engineers were up against the problem of devising methods, procedure and equip

(RT&S, July, p. 23) affords an outstanding example of a track-lowering

project.

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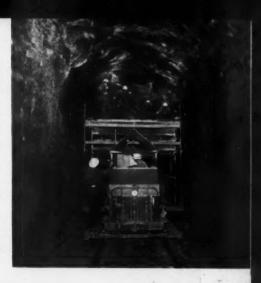
Enlarging a tunnel in the roof area is certain to be a costly procedure even under the best of circumstances. A project of this type is relatively simple if the work involves enlarging an unlined bore, as in the manner illustrated in the L&N project described at the right. If it involves the removal of an existing lining and its replacement with a similar or different type of lining, then additional complications are introduced.

In either case, and as with practically all types of overhead work done in tunnels, careful planning is required in order that the work may progress with as much efficiency as possible. The requirements include adequate lighting, provision of means of getting men, materials and equipment into and out of the tunnel with dispatch, and movable scaffolding that will give ready and easy access to the working faces. Some of the devices that have been developed and are in use for these purposes are illustrated in the accompanying photographs. The cooperation of the operating department in "bunching" trains through tunnels will help reduce the cost of repair work by minimizing delays due to train movements.

Enlarges unlined tunnel

A project carried out recently on the Louisville & Nashville provides an example of how to enlarge an unlined tunnel driven through rock. The project involved the road's 2,228-ft Cumberland tunnel south of Cowan, Tenn., on the Chattanooga division. The need for a larger bore was brought about chiefly by the introduction of piggyback service. Both vertical and lateral clearances were increased.

The job was done by drilling and blasting, and the work was carried out by company forces. Procedure developed into a routine of drilling at night and blasting and removing the debris during the daytime. In the course of a night of drilling the crew would drill about 300 holes placed in rows spaced about 30 in apart along the length of the tunnel. Scaling of the surfaces was also done at night.





ABOVE—Drilling and scaling after blasting were carried out from track-mewnted scaffolding. Drilling was done at night.

LEFT — End loader dumps debris inte truck. A bulldozer, on other side of pile, pushes material into bucket of loader.



repair, daylighting program

ment designed to minimize interruptions to the work as well as interference with train movements. For use inside tunnels they saw the need for a type of scaffolding that would fully meet the needs of the work but which could be quickly removed from the tunnel to clear for trains. The result—developed in collaboration with Athey Products Corporation—is a motorized-scaffold unit on which is mounted an adjustable center platform and folding side platforms. The accompanying group of pictures shows this and other equipment in use in the tunnel work on the B&O.

ABOVE—Equipment moves in to clear debris left on track following detonation of blasting charge in tunnel-daylighting operation underway on the B&O.

RIGHT—Wagon drill boring blasting holes on daylighting job. Delaying connectors were were used to time detonations to achieve the best results.



Big waterproofing job

RAILWAY TRACK and STRUCTURES

Tunnel work cont'd



WATER coming through lining of Otisville tunnel created many problems, including muddy track and ice.



. . . Erie took these steps



How the Erie is repairing and wa

Extensive repair program being carried out in milelong Otisville tunnel involves the application of two coats of shotcrete with waterproofing additive. Similar treatment, with addition of roof bolts, is being applied to unlined section.

• Work now being done in the Erie's Otisville tunnel provides an interesting example of how to waterproof a badly deteriorated brick lining. This work, in combination with other measures, is expected to put an end to serious problems that have plagued the railroad for years as a result of extensive leakage through the lining in this tunnel.

This brief history of the tunnel and description of the repair work now under way was provided by L. H. Jentoft, assistant chief engineer—maintenance of way of the Erie.

The Otisville tunnel is located on the Erie's so-called Graham line which was built in 1906-08. It was constructed as a freight line to by-pass

the heavy grades and curvature of the main line through Orange county, New York. The tunnel was required when it was necessary to project the line through Shawangunk mountain at Otisville, N. Y. The elevation of the Graham Line through the tunnel is about 125 ft lower than the old main line through Otisville.

The tunnel, built for double track, is on tangent alinement and is 5,314 ft long from portal to portal. It was driven through sandstone, limestone, slate and conglomerate rock. For 4,388 ft it was lined with red brick from spring line to spring line across the top. From the spring line down to the floor, concrete bench walls were constructed. A section 926 ft

long was not lined and until 1955 remained in its original cut condition. At each end the tunnel terminates in a concrete portal.

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At a point 2500 ft from the east end a construction shaft was driven from the roof of the tunnel vertically up to the surface. This was left open as an air shaft. However, it was closed in 1955 after a cave-in following continuous, heavy rains which caused the rotted wooden side-sheeting to collapse. The floor of the tunnel was never lined and remains today in its original cut condition.

Leakage creates problems

Extensive water leakage through the roof and walls of the tunnel and the inadequate drainage originally provided, created many maintenance problems. These included hazardous ice conditions during winter months, extremely wet and muddy conditions with the resultant difficulties with foul ballast and track surface, disintegra-

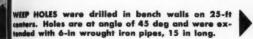


SCTION of lining at bench wall near expansion joint (left), showng wire mesh in place to receive shotcrete. Brick was sand blasted.



SHOTCRETE is applied to average depth of $1\frac{3}{4}$ in over $\frac{1}{4}$ -in seal coat of pressure concrete containing waterproofing material.

SINGLE TRACKING of tunnel permitted use of scaffolding so built as to clear trains. Scaffolding is wheel-mounted and moves on track of its own.





waterproofing an old brick lining

tion and scaling off of the rock surfaces in the unlined rock section of the tunnel, as well as difficulty in maintaining track signal circuits because of the wet track structure.

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In the winter it was necessary to maintain a 24-hr watch in the tunnel because of the menace created by large overhead icicles and ice formations on the sides of the tunnel, reducing side clearances to critical dimensions. The constant wet condition of the track structure made it necessary to crib out and replace the foul ballast with fresh ballast every four or five years. This was a very costly procedure during steam locomotive operations due to the extremely adverse working conditions and lack of working space for men and equipment, as a high proportion of hand work was necessary.

Also, during the days of steam locomotive operation, it was difficult to walk into the tunnel for an inspection. Near the end of the cycle it was not unusual to find the sides so filled with mud and stack ashes that the ditches were higher than the track and the journal boxes and caboose steps cut their profile or clearance through the mud.

Alternate freezing and thawing, stack blast from steam locomotives and vibration from trains made it necessary to have carpenter forces work through the tunnel to scale off loose or disintegrated rock from the rock faces in the unlined sections of the tunnel. This was necessary at least twice a year. The lined sections required frequent inspection and removal of disintegrated brick lining.

Single-tracked in 1953

The brick lining was constructed with five courses of brick. In many places the water leakage through the lining and the freezing and thawing caused the brick to disintegrate and fall out until only three courses remained, and close watch and inspection was always necessary.

During 1953 the westbound track was removed from the tunnel and the eastbound track was lined to the center of the tunnel. Included in these track changes was the retirement of the main passenger tracks from Graham, N. Y., to Howells, and the installation of CTC from Port Jervis, N. Y., to Howells via the Graham Line and the Otisville Tunnel. These changes made the Graham Line the only track connection between Howells Junction and Graham so that all Erie traffic, both freight and passenger, must now use the tunnel instead of the old route over the mountain.

While the single-tracking of the tunnel did not eliminate the undesirable ballast conditions, it did allow for better drainage and created additional working room, thereby permitting more efficient maintenance operations. It also eliminated the side clearance hazards due to ice and reduced the overhead threat of icicles, although the latter remained a menace during cold weather. Also, the advent of die-

Tunnel work cont'd



PREFORMED rubber expansion seals were placed at each weep hole before shotcrete was applied. They extend around arch.

sel operation tended to ease another factor contributing to the fouling of the ballast, namely, the accumulation of stack ashes on the roadbed inside the tunnel.

Decide on upgrading program

Notwithstanding the betterment in conditions in the tunnel resulting from these factors, problems created by leakage and poor drainage remained a source of trouble. For this reason, and in view of the greater importance of the tunnel that resulted when it became the only route between Howells Junction and Graham, it was decided to undertake a program of general upgrading and reconditioning in the tunnel.

To improve the drainage, a new ditch was dug on each side through the tunnel. Approximately 1,500 cu yd of rock were removed. This ditching proved to be very effective in draining the track structure. To eliminate the overhead leakage, a water-tight lining of pressure concrete from spring line to spring line was decided upon.

Weep holes cut in bench walls

Along with the waterproofing, provision had to be made to conduct the water from the water-bearing rock to the ditches and out of the tunnel. This was accomplished by cutting 7-in weep holes through the bench walls in the lined sections at 25-ft intervals on each side. These holes were cut below the spring line and were extended with wrought iron pipe. They were necessary to eliminate any possibility of

hydrostatic head forming that might exert a dangerous pressure on the lining before the water could find another outlet.

Under a contract with the Penetryn System, Inc., the lining of the tunnel with pressure concrete (shotcrete), using a patented ingredient and patented methods, was started in 1955 and is being continued on a program basis through 1960. Of the 4,388 ft of lined tunnel 4,063 ft has been completed on a programmed basis since 1955. This leaves 325 ft of the original lined portion uncompleted. However, this portion is in such good condition that it will not need attention for a number of years. As for the 926 ft that were not lined, 772 ft has been repaired, strengthened and waterproofed. Since the remaining 154 ft of this section has never given any trouble it is felt that repairs will not be required on it for some time.

Prior to the present program, a particularly troublesome section of the brick-lined section of the tunnel, 75 ft in length, was waterproofed and shotcrete applied in 1938. Repairs were made to this 75-ft section in 1955. However, the nature and design of the waterproofing and lining in this section are different from the work now in progress.

How work is being done

The construction procedures and methods now being used in applying the pressure concrete waterproof lining to the tunnel are as follows:

Step 1: Drill 7-in weep holes just below spring line on each side at 45deg angle, on 25-ft centers. Extend these with 6-in wrought iron pipes 15 in long, securely grouted in place.

Step 2: Drill holes in brick lining for hook anchor bolts. This is done with 34-in bit, and holes are drilled 3 in into the brick. Spacing of these holes is 2 ft center to center in each direction.

Step 3: Cut recess 2 in deep at the top of the bench walls and approximately 12-in up into the brick to form a seat for the newly applied lining.

Step 4: Clean brick by sand blasting, using a pressure of 70 to 80 psi.

Step 5: Place %-in by 4-in hooked expansion bolts in the previously drilled holes on 24-in centers in each direction. These bolts are to anchor the wire mesh to be applied later.

Step 6: Place 1/8-in by 12-in preformed rubber expansion seals every

25 ft, at each weep hole. These se extend from bench wall to bench wa

Step 7: An average of ¼-in the seal coat of waterproof pressure correte containing Metal Kote waterproofing material is applied over a tire arch of tunnel.

Step 8: After waterproofing as a scribed in Step 6 has been proper cured, usually the following day, check is made for wet spots or leab Where these are found, an application of a mix containing Sica is applied.

Step 9: No. 12 gauge 2-in by 2; wire mesh is installed over the entisoffit and securely wired to the hools anchor bolts previously installed.

Step 10: Place a pressure concerning averaging 134 in thick over the entire arch soffit from bench wall abench wall.

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High-strength roof bolts used

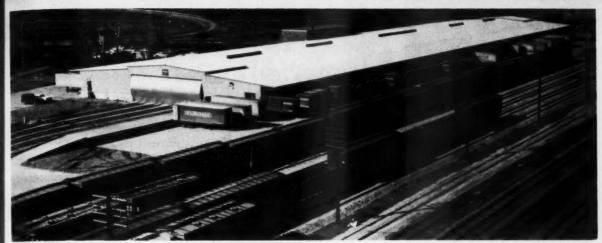
The waterproofing of the unline rock section of the tunnel is done in the same manner as the brick-line section with the following exceptions

The waterproofing and lining an confined to the roof area for a dis tance of 10 ft each side of the center line of tunnel. No side weep holes at necessary. High-strength roof bold 3/4 in by 7 ft, were installed 2 ft or from center line on each side on 4 centers, also two lines of roof bolts % in by 9 ft were placed 6 ft and 10ft each side of center line of tunnel 4-ft centers. These long roof bolts at equipped with Type CZ self-support ing expansion shields to hold the ro in the rock. On the opposite end a 64 by 6-in by 3/8-in plate washer is bolto fast. The purpose of these bolts is a stabilize and anchor the rock over head.

The work is being done under traffic The scaffolding is built around the track (photo, p. 26), so men can work without delay. The scaffolding is on wheels and is moved on a timber track built for this purpose. Clearance of the scaffold from near rail is 5 ft clearance above top of rail is 19 ft 3 in

The new lining reduces the ownhead clearance by approximately 2 in and the side clearance about 2 in of each side.

Says Mr. Jentoft: "You can not walk through the tunnel in your Sunday clothes and go to church after the trip, fresh and clean. Years ago one needed a raincoat, boots, a 'Sou-Wester'—and a lot of good luck to get through without falling down."



FREIGHTHOUSE is located adjacent to Burlington's freight yard in North Kansas City. Roof has aluminum sheets and plastic skylights.

Advanced features for big, new freighthouse

• A new freighthouse the Burlington has built at North Kansas City incorporates a number of advanced features of design, in addition to most of the modern design features generally found in such structures built today.

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Of prefabricated metal construction, the freighthouse proper consists of a single building covering two concrete platforms separated by four tracks that extend through the structure. It is 709 ft long and 148 ft wide, not including a 10-ft canopy overhanging the tailboard space on each side.

The main building is a Butler structure and consists of a rigid-frame center bay, 58 ft 7 in wide, spanning the tracks, and side bays, 43 ft 10 in wide, of simple beam construction. The main members are fashioned from sheet metal and have welded connections, except that the purlins, which are of high-tensile steel and have a Z-shaped section, are bolted to the roof beams.

The particular type of structural framing used made possible one of the noteworthy features of the building—a continuous uninterrupted roof slope on a pitch of 1 in 12 from the center ridge to the eaves. The uniform expanse of the roof slopes is broken only at the ends of the structure where it was necessary to provide shallow raised sections or clerestories to accommodate the end doors.

Areas of the side and end walls not occupied by door openings are covered with galvanized steel sheets. The roof, on the other hand, consists of ribbed aluminum sheets. For daylight illumination, skylights of translucent plastic sheets are incorporated in the roof. There are two lines of these panels on each side of the roof gable, one over the track area and one over the platform.

Other features of the new facility include a motor-operated retractable bridge which spans the tracks midway of the building, a motor-operated overhead aluminum rocker door at each end that opens or closes in 30 seconds to allow cars to be switched into or out of the building, and an underfloor drag-chain circuit which serves both platforms. At the ends of the platforms the circuit is carried down to the track level on ramps and crosses the tracks at grade.

An office building, of brick and concrete construction, built in conjunction with the freighthouse, also has some unusual features, explains C. J. Bonnevier, the Burlington's engineer of buildings. One is the use of precast, prestressed concrete roof and floor slabs. The sections are of the double-T design and are made of Haydite concrete for light weight. After installation these slabs were covered with a 2-in concrete topping.



UNDERFLOOR towing circuit serves both platforms, crosses the tracks at grade.



RETRACTABLE bridge permits traffic between platforms. Note light from roof.



OFFICE space in brick building has diagonal fluorescent lighting fixtures.



M/W Supervisors Wh

There's a world of significance in these two questions. Progress in maintenance practices has had the effect of upgrading the qualifications for those who have supervisory responsibilities in connection with track and B&B work. The result, as brought out in this article, is that many roads are devoting more care to the selection and training of supervisory personnel.

● Do today's track and B&B supervisors have to know more than their counterparts of 20 years ago? Are men of a higher caliber required? If so, what steps are the railroads taking to assure themselves of a supply of supervisory talent? How are they training the men selected? This article is based on answers to these questions as obtained in interviews with a number of top engineering officers.

First, where do railroads get their new supervisors?

For the most part, according to the men interviewed, they come from the foremen's ranks. However, many are young engineers. Roadmasters, master carpenters and division engineers are constantly on the alert to spot men of supervisory caliber. When found, they encourage young men of ability and with qualities of leadership to obtain more education through correspondence courses. In a few instances, railroads have paid the tuition for some of their more promising young men. They are also encouraged to bid for jobs which will increase their railroad experience. However, seniority is an obstacle and, unless men with more seniority do not want to move, the young men may be hampered in this respect.

Some roads build a backlog of potential roadmasters, supervisors and master carpenters by selecting qualified young men and making them assistants to the men presently holding such positions. In these capacities, the assistants carry out work as directed, accompany detector cars, weed-and-brush spray outfits and tie-unloading trains. They learn under the guidance of experienced superiors.

"We start them out on our important trunk lines where our standards are high," explained one maintenance officer. "Later on they will work on our branch lines but by then they know what good maintenance requires. We think it would be a mistake to start them on branch lines because they could get wrong impressions," he added.

They're looking ahead

Most, but by no means all, maintenance officers are looking years ahead in the selection and training of replacements for supervisors, roadmasters and master carpenters. In general, young men in their late 20's or early 30's are selected so they can be fully trained by their mid-30's. This training includes terminal experience, as well as work on high-speed and branch-line trackage, to assure a wellrounded training.

Asked if they are having difficulty in filling supervisory positions, most of the maintenance officers replied that they were experiencing little trouble in this respect. One officer, however, qualified his comment by saying that while "this problem isn't critical neither is it easy." Another, taking a look at a statement showing the retirement dates of his supervisory personnel, pointed out that he would have several jobs to fill within the next few years. "This situation," he added, "is going to open up opportunities to younger men."

Another officer admitted that it was becoming increasingly difficult to obtain good track supervisors. The reduction in section forces and the expanded territories have, in his opinion, discouraged many aspirants because the work required them to be away from home more often. He was of the opinion that his own problem would get worse before it got better.

Another maintenance officer stated that he had four men at the present time who could be moved into roadmaster's positions right away and two into B&B supervisor's positions, although he hopes they will be able to get another year of experience. He attributed this good situation to the fact that he had looked ahead several years. Four of these potential supervisory officers, he said, had some engineering experience, but were not graduates. "It is surprising," he added, "how few engineering graduates will aspire to roadmaster's and chief carpenter's jobs. Our best division engineers are those who have had such experience."

The maintenance officer of a large western road explained that he had a "built-in" method for obtaining road-master material. He created an appointive job with the title of "general foreman," which pays considerably more than the salary of section foreman. Each general foreman is in charge of one of the road's many surfacing-and-lining gangs, with full responsibilities. Since roadmaster vacancies are filled from the ranks of the general foremen, section and gang foremen aspire to this position.

Another maintenance officer explained that he was anticipating the need for supervisory replacements by hiring several technical college graduates as assistant supervisors for track, bridge and building, and signal work. Two years of such training usually qualifies them to step into supervisor's jobs, he said.

Training present supervisors

What's being done about the training of existing supervisory personnel? The interviews indicated that the changes taking place in maintenance practices, primarily the trend to more intensive mechanization, call for a new approach and flexibility in the thinking of supervisors. Hence, some roads have instituted training courses

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Where are they coming from?

How are they being trained?

where current methods and policies are explained. In all such cases, the care and use of machines are included in the curriculum.

Some of these courses are of the "one-shot" type, while others are of the instruction-at-interval type. One large western railroad recently conducted a two-day seminar on the operation of raising, tamping and lining equipment. Included was the showing of moving pictures of these units in action. All division engineers, roadmasters and work-equipment mechanics within a convenient distance were present at this meeting. The seminar will be repeated at other strategic points on the road until all supervisory personnel have been given these instructions.

A large Canadian road recently conducted a week-long specialized-training course for 10 of its roadmasters. This course will be repeated until all roadmasters and supervisors have been subjected to it. The course includes lectures on supervisory training, budget work, cost control, work studies, welding and rule instructions, as well as field excursions. The training program eventually will be placed on a continuous basis so as to include other maintenance-of-way employees. Soon to start is a training course for section foremen which will include instructions on 30 phases of track work ranging from track lining to the proper use of fire-fighting equipment.

Training on a terminal

For some time a terminal railroad has been conducting a training course on track and roadway maintenance and construction. Afternoon meetings are held once each week. Textbooks for the course are Rench's Roadway And Track, texts from the International Correspondence Schools, railroad periodicals and publications from the Railway Educational Bureau. Changes were made to adapt the material to the problems actually encountered on the railroad. In addition to classroom training, the group performs some of its work in the field. Each supervisor, at one time or another, serves as a discussion leader.

Because of the importance of machines in maintenance, this course includes comprehensive training on the uses and operation of the M/W equipment owned by the road. Each week during this phase of the course the group is instructed in the operation of one or more machines.

"We started these courses," said the chief engineer, "primarily because we had many young men who didn't know too much about railroading. At the same time, they serve as refresher

training for our older supervisors." The reasons why management has adopted certain policies and practices also are explained at these meetings.

Because of the importance of securing full performance from machines, all of the officers interviewed stated that they send some of their track supervisors along with their mechanics and supervisors of work equipment to the training schools conducted at the plants of some of the machine manufacturers.



CLASSROOM VIEW of school held at La Junta. In front row, from left, are: J. E. Elsemann, ch. engr., Western Lines; C. F. Lewis, supt. work. equip., sys.; P. Immroth, rdm.; and Ben Sorrels, asst. rdm. Standing at far right are Don Reynolds (left), elect. engr., and D. D. Kinney, service dept. mgr., Jackson Vibrators, Inc.

Santa Fe school on tamper operation, maintenance

Two-day training sessions held recently on the Western Lines of the Santa Fe afford an example of one type of schooling being given to M/W employees, including supervisors.

In this particular case the purpose of the school was to provide technical and practical information on the maintenance and operation of the company's Jackson Track Maintainers. The two-day school was held at two locations, first at Amarillo, Tex., and later at La Junta, Colo.

The personnel attending the training sessions included all employees concerned with the operation and maintenance of the equipment. The groups were headed in each case by J. E. Eisemann, chief engineer of the Santa Fe's Western Lines. In attendance were district engineers, division engineers, roadmasters, equipment maintainers, various foremen, and all machine operators who were either operating this equipment or had a potential future in its operation and maintenance.

In charge of the school was J. L. Pratt, assistant work equipment supervisor on the Western Lines, who made all the arrangements, gathered together the necessary materials, both written and visual, and organized the attendance. Jackson Vibrators, Inc., manufacturer of the equipment under study, cooperated in putting on the schools, and technical personnel furnished by this company acted as instructors. These included David D. Kinney, manager of the company's service department, Don Reynolds, electrical engineer, James W. Prewitt, service engineer, and Glen H. Haywood, service engineer.

A primary consideration behind the decision to hold these training sessions was the fact that the road had recently acquired a number of the particular machines in a relatively short period of time. Hence, it was felt that all concerned should be given the benefit of the knowledge needed to properly service and operate them for opti-



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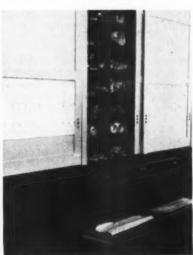
CUMBERSOME drafting tables and high stools give way to modern metal deaks with boards which are readily adjustable for both sitting and standing positions.



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MAP CASES have dustfree drawers equipped with a tracing lifter and a mechanism for keeping the tracings flat.





Drafting room gets nevig

Not often does an engineering department get an opportunity to apply its skill to the betterment of its own surroundings. But this happened on the Santa Fe at Los Angeles. Result: A modernized drafting room that provides a more pleasant, efficient place to work.

● The Santa Fe has recently completed modernization of its central drafting room in the engineering department at Los Angeles. Incorporation of the latest features in lighting and drafting equipment, plus air-conditioning, is designed to make it one of the most modern layouts of its kind.

While no major structural changes were made, the working area was greatly increased through the replacement of bulky storage cabinets and furniture with modern space-saving equipment. Microfilming of many of the maps and records further reduced the amount of space required for storage.

A Holophane Prismalume Controlens luminous ceiling increased the light intensity from 40 to 160 candlepower, eliminating both glare and shadow.

The newly installed auto-shift drawing boards are completely adjustable by means of a foot pedal for height and a hand lever for angle or slope, making it possible for the draftsman to work comfortably whether standing or sitting. Each board is supplement-

ed by an easily accessible drawer and reference-space cabinet located direcly behind the draftsman and providing a convenient place for bulky reference material, etc. for

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The problem of storing and presening some 29,000 sets of maps, consising of 1 to 50 sheets each, was solved by the introduction of compact metamap cases, fitted with dust-free roller-bearing drawers. Drawers are equipped with tracing lifters, a medanism contained within the drawer to permit easy removal or filing of maps. A rear hood adjusts its height to the contents, maintaining compression at the rear of the drawer and thereby proventing wear and tear of the map through curling or riding up.

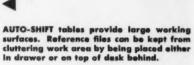
Original location maps, filing maps and other maps not filed with the carrent record maps, but which must be retained for frequent reference, we filmed on 105-mm Micro-Master films a 4-in by 6-in negative which is said to give good reproduction of drawing up to 36 in by 54 in. This negative can be used to produce a full-size, half-size or any intermediate scale, second





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ighting, work aids, microfilming

original, free from distortion, on many forms of transparent materials. It is said to provide reproductions that are much clearer than the aged and torn originals, to be easier to handle and to require far less filing space.

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A viewing table with a 41-in by 59-in top permits viewing full-size images of the original drawings and can be used for the same purposes, i.e., scaling dimensions, tracing all or portions, reference purposes, etc. Although the negatives are large enough for identification with the naked eye, portable viewers have been provided for spot magnification and are easily moved from desk to desk, or office to office.

In addition to replacing the old record and reference maps with Micro-Master film, the Micro-Master reproduction method is being used for the replacement of worn-out linen tracings reproduced on linen. This has resulted in substantial savings in time, labor and material.

Record maps seldom referred to, but which nevertheless must be retained, were filmed on 35-mm film. These also may be reproduced on transparencies, or by the ordinary photographic-reproduction process. The 35-mm microfilm negatives are mounted on aperture cards so that both types of film may be filed in the

same drawers and viewed with the same viewer.

It is estimated that the microfilming of these maps reduced the filing space to one one-hundredth of that formerly required, thereby creating a larger area for uncrowded arrangement of the new equipment.

This modern facility, with its improved lighting system, up-to-date drafting equipment and efficient and compact setup for filing and preserving both current and older maps and records, has, says the road, resulted in increased productivity and improved morale among the workers in the drafting room.



VIEWER TABLE on which 4-in by 6-in microfilms can be inserted in projector at right to cast images of full-size drawings.



TOPS of conveniently placed map cases provide additional work surfaces. Table at rear was designed and built in Santa Fe shops.



Concrete crossing foundation

A post-tensioned, prestressed concrete railroad crossing foundation was recently installed for test purposes under the tracks of the Indiana Harbor Belt at Chicago. It was designed by the AAR research staff and built by the Portland Cement Association. The



crossing was placed on a ½-in rubber pad on the new foundation and rests between steel lugs embedded in the concrete. No mechanical fastenings were used. In view at left, L. R. Lamport, AAR, examines a test cable. Looking on (left to right) are: C. H. Johnson, IC; L. P. Nicholson, PCA; R. B. Radkey, IC; C. E. Peterson and Elmer Honath, both Santa Fe; and G. M. Magee, AAR.



New bridge for C&NW

Trains of the Chicago & North Western are now operating over the top level of a new three-level grade-separation structure at Jefferson Park on Chicago's north side. The structure was constructed as part of the city's Northwest Expressway to carry the

News briefs in pictures . . .

New produce terminal for NP

The Northern Pacific has recently completed construction of a \$650,000 produce terminal at Seattle, Wash. Replacing an old terminal, the new 480-ft by 80-ft, one-story, concrete block building has a prestressed concrete roof. There is a 10-ft platform on the track side and a 15-ft platform on the tailboard side.



tracks and Milwaukee Ave. over the expressway. During construction the tracks were carried around the site (above) on a 2000-ft, three-track shoo-fly on a curved alinement. The shooff consisted of two lines of sheet piling tied together with steel rose. The space between was filled with compacted earth (RT&S, Maj. p. 35). A temporary station was provided on the shoo-fly.

AUGUST, 1960

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RAILWAY TRACK and STRUCTURE

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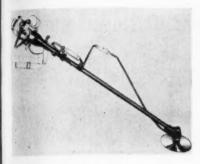
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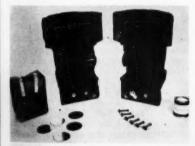


New model introduced . . .

Brush cutter

THE MODEL 660 Brushking portable power brush-cutting machine has been introduced. The new model is stated to feature a 50 per cent power increase which gives it up to 50 per cent higher efficiency and cutting capacity. This is said virtually to eliminate any tendency of the blade to bind even when cutting through dense and heavy brush or trees up to 9 in. in diameter.

The Model 660 provides 3 hp with no increase in the size or weight of the machine. It is equipped with anti-friction needle and ball bearings, plus special magnesium and aluminum fittings throughout. These are claimed to minimize vibration in the new higher powered unit. Rowco Manufacturing Company, Inc., Dept. RTS, Keene, N. H.



New Thermit method for . . .

Rail welding

A NEW method of welding rails by the Thermit process has been introduced. The method, known as the Self-Preheat Thermit Weld, eliminates preheating rail ends prior to welding and utilizes welding compound and preformed, factory-made molds, doing away with the preparation of molds on the job. No equipment is required and the material is supplied in kits which contain everything needed to make one weld in rail of a prescribed section.

The welding procedure involves three steps: (1) Alining the rail ends; (2) applying the molds; and (3) pouring the welding compound into the molds and igniting it. The manufacturer claims that a complete weld can be made in from 5 to 6 min. The new method is said to be fully developed for all standard rails up to and including 100-lb sections. It will be made available for heavier sections in the near future. Thermex Metallurgical, Inc., Dept. RTS, Lakehurst, N. J.



Identify property with . . .

Marking nails

THREE types of marking nails are available for identifying or dating materials and equipment. Designated MN-1, MN-2, and MN-3, they are made from copper or aluminum with different size heads and in a number of different lengths. Letters, numbers or trademarks can be embossed on the heads. Type MN-1 has a 1-in diameter head and is available in 2, 21/2 and 31/2-in lengths. Markings are raised and can be set in three lines. The nails can be numbered consecutively up to 9,999.

The head of the Type MN-2 is 34 in. in

diameter. This type is available in 2 and 21/2-in lengths. Type MN-3 has a 1/2-in diameter head and is available in 11/2, 2 and 2½-in lengths. Both the MN-2 and MN-3 have depressed markings. John Hassall, Inc., Dept. TR-RTS, Cantiague Road, Westbury, L.I., N.Y.



Selective killing with . . .

Tree injector

DIRECT injection of herbicide into the inner bark of a tree can be accomplished by the new Reuel Little Tree Injector. The manufacturer states that the device can be used during any time of the year and permits selective killing of brush and trees. The injector is 5 ft long and has a 21/2-in barrel which holds 71/2 pt of herbicide. It weighs 11 lb empty and is equipped with a circular handle near the middle, a triphandle at the top for releasing the chemical and a duck-bill-shaped cutting bit on the end. The latter is thrown into the base of the tree, making a pocket into which the chemical is released. It is stated that the chemical circulates in the tree killing both top and bottom. One man equipped with the device can treat 2 to 4 acres a day, it is claimed. A chemical herbicide for use in the injector is also marketed by the manufacturer. Reuel Little Tree Injection Company, Dept. RTS, Madill, Okla.



For heavy equipment ...

Portable unloader

DESIGNED to unload heavy equipment from cars, the new TPC lightweight portable equipment unloader is available in several load capacities or it can be furnished to meet railroad specifications. The manufacturer states that the new portable unloader can be set up by two men in 30 min. Transport Products Corporation, Dept. RTS, 3008 Magazine St., Louisville 11, Ky. (Please turn the page)



Improvements made to ...

Motor graders

THREE new models of Caterpillar motor graders are available which incorporate major improvements, including new en-gines, that are claimed to substantially increase machine productivity. The motor graders are the Nos. 112 Series E, 112 Series F and 12 Series E. The manufacturer states that introduction of the new No. 112 F amounts to the addition of a fourth machine to the company's line of motor graders. It is powered by a turbocharged four-cylinder diesel engine which is rated at 100 hp. Horsepower of the No. 112 E has been increased to 85, an increase of 13 per cent over the previous model. The No. 12 E is rated at 115 hp. Both the Nos. 112 E and 112 F incorporate the Caterpillar oil clutch, improved blade controls and onepiece transmission and final drive case. The engines of all three models are equipped with the Caterpillar dry-type air cleaner.

Features claimed for the new machines include positive assurance against moldboard creeping, provided by a new control lock, and smoother control lever engagement, resulting from adoption of a new twotooth jaw clutch on both the Nos. 112 E and 112 F. Side-slope workability of the No. 12 E has been improved through lowering of the machine's center of gravity. In addition, it has been given greater stability than previous models by increasing weight in the wheels. All three motor graders are equipped with a newly designed gasoline starting engine for in-seat starting. The gasoline starting engine is started by a 12-v electrical system or a recoil-type manual starter. A 24-v direct electric starting system is available as optional equipment. Caterpillar Tractor Company, Dept. RTS, Peoria, Ill.

For weed and grasses . . .

New herbicide

A NEW chemical weed killer is available which is claimed to give rapid knockdown and residual control of most weeds and grasses for a full season without additional application or cultivation. Known as Amizine, it is a wettable powder which can be applied as a spray in spring or early summer after weeds and grasses are growing. The chemical is stated to be non-inflammable, non-corrosive, odorless and safer for animals and pets because of low toxicity. The manufacturer claims that Amizine does not move in the soil to injure turf or plants out of the sprayed area. Amchem Products, Inc., Dept. RTS, Ambler, Pa.



Higher run-down speed for . . .

Impact wrench

HIGH maneuverability in cramped quarters, due to its 2-5/16-in shorter length, is stated to be one of the features of the new Ingersoll-Rand Size 810 Impactool. In addition, run-down speed has been increased 91 per cent. It is 734 in long, weighs 11 lb, less socket, and has a 34-in bolt capacity. The new Impactool is said to deliver 1000 impacts per minute and has a free speed of 4300 rpm. A new direct drive between motor and hammer is claimed to provide greater torque and speed for heavy-duty nut running. Other features include a steel hammer case, straight-push nylon trigger and a rubber-faced throttle valve that provides a positive seal when the valve is in the closed position.

Standard equipment includes a ¾-in square drive. Optional equipment includes 3, 6 or 8-in extended anvils with a ¾-in square drive and a 1-in square drive or a quick change anvil with a ¾-in hexagon recess. Ingersoll-Rand Company, Dept. RTS, 11 Broadway, New York 4.

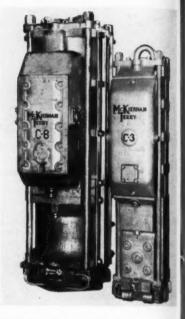


For structural steel . . .

Protective coatings

TWO new cold-applied protective coatings are available which are stated to be highly resistant to permeation by chemicals. One, known as Bituplastic No. 33, is a heavy-duty protective coating particularly suited for intermittent splash and high chemical "fallout" areas. It is a coal-tar polymer emulsion which can be applied by brush, roller or spray. The new coating is intended for use on structural steel, sheet piling and deck areas.

The other new coating, known as Bisplastic No. 44, is also said to have a very low permeability rating. It can be used to adhere cellular glass insulating blocks to storage tanks and to underground piping as a top coating for insulation and as a general purpose insulation mortar. Koppen Company, Inc. Dept. RTS, Pittsburgh 19, Pa.



High-speed operation for ...

New pile hammers

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TWO NEW models have been added to the McKiernan-Terry line of C-type doubleacting pile hammers. The new models, deignated C-3 and C-8, follow the design of the basic C-5 hammer. The latter is stated to have an all-new patented operating cycle which allows a high rate of energy output at low steam or air consumption. In atdition, the hammers have the ram overtravel safety feature which is designed to prevent damage to the one-piece ram and to hammer parts if the pile breaks or suddenly drives through a soft stratum and the anvil block is left unsupported. Other features claimed for the hammers include self-seating valves that eliminate need for additional air or steam as the hammer ages. and high-speed operation combined with low striking velocity comparable to that d single-acting hammers.

The 8500-lb C-3 delivers 130-140 blows per minute in average driving and works with either a 500 or 600-cfm air compressor or a McKiernan-Clayton steam generator utilizing 1350 lb of steam per minute. Its work scope includes wood piles, most gauges of steel sheeting and other piles of up to 60-ton bearing. The C-8 op erates with a 900-cfm air compressor or the McKiernan-Clayton steam generator # 2600 lb of steam per minute. It delivers 77 to 85 blows per minute, weighs 18,750 lb and is designed to drive heavy piles, including pipe, concrete and H-beam, to bearing of up to 125 tons. McKiernan-Terry Corp oration, Dept. RTS, Dover, N. J.

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Forking ballast to tampers

The general practice is to work two laborers just ahead of a production tamper for forking ballast to the inside of the rails. Would it be possible to eliminate these two men by placing more ballast inside the rails when unloading fresh ballast, or by using a ballast equalizing machine to do this ahead of the raising? Explain.

Not with small ballast

By W. A. SCHUBERT Division Engineer (Ret.) St. Louis-San Francisco Chaffee, Mo.

Since the introduction of production tampers, my experience has been limited to chatt ballast, whereas the question as posed would indicate that it applied to locations where stone or other heavy ballast is in use. The difference in the type of ballast, however, should not make too much difference in my answer to this question.

Our operation has not permitted us to eliminate these two men since it includes the insertion of ties. If more ballast were unloaded, either by a work train or placed inside of the rails by a ballast equalizer, it would cover up the spikes to be pulled, slowing up that operation. This would make it more difficult to remove the old ties and would cause them to hang while being pulled out whenever the ballast came in contact with the base of rail.

At locations where the spikes are not well seated and the track is jacked for the raise, the ballast would roll between base of the rail and the tie plate and create the problem of having to clean that ballast out before a tie could be nipped for tamping. This again would slow up production.

Between the cycles of production tampers, my practice has been to keep the cribs well filled with ballast by replacing the ballast used up by division forces while spotting. Maintaining a standard ballast section usually provides sufficient ballast for a desired track raise when the production tampers return on their cycle. The two men in question will then not be hard pressed in keeping the tamper in good production.

We have also found that sufficient ballast permits a better job of tamping. whereas, excessive ballast would slow up the production. At the present time one of the roadmasters has a semi-mechanized gang, consisting of a production tamper and a ballast equalizer with broom attachment. In this operation he does not unload any ballast ahead of the production tamper. but uses the ballast in the crib and from the shoulder, filling in after gang has completed the surfacing. This roadmaster has for the past year filled in all semi-skeletonized track in preparation for this production gang with splendid results.

Two ballast spreads

By C. HALVERSON General Roadmaster Great Northern Willmar, Minn.

When unloading new ballast for an out-of-face lift of four inches, it is a practice to unload two spreads of ballast in the center of the track with center-dump hopper ballast cars.

A combination ballast and snow dozer is used to plow out the new ballast from the center of the track to the outside for the ballast shoulder. After the second spread of ballast is made, temporary steel blades are fastened to the front end of the dozer to plow out the ballast from the center of the track to the desired depth, leaving enough ballast in the track to obtain uniform

NEW QUESTIONS to be answered in November

Do you have an answer to any of the questions listed below? If so, send it in. Payment—based upon substance and length-will be made for each published answer. If you wish your name withheld, we'll gladly comply.

DEADLINE: September 30

• 1. When it is necessary to make cuts for insulated joints and turnouts while laying continuous welded rail, how should this be done? What cutting equipment should be used? If a power saw, how can the rail expansion be controlled to prevent pinching of the saw? Explain.

- 2. Under what conditions is it advisable to double-cap a bent of a timber bridge? Explain. Should the additional cap be the same size as the existing one? Why? Describe best procedure for carrying out such work.
- 3. In winter, what steps can be taken to correct a situation where a highway crossing has heaved badly? Explain in detail. What special measures can be taken before winter to avoid such occurrences?
- 4. What stock of emergency materials should be carried on hand for repairs to fueling stations? Why? Where should this material be kept?

• 5. When a division welder and helper finish repairing the frogs, switch points, stock rails and guard rails at one town, what other constructive work should they do before moving on to the next town? Describe in de-

Send answers to:

What's the Answer Editor Railway Track & Structures 79 West Monroe Street Chicago 3, Illinois

Do you have a question you'd like to have answered in these columns? If so, please send it in. tamping with the production tamper without having to fork in ballast by hand.

Equalize ballast

By A. D. HENNINGER General Roadmaster Soo Line Minneapolis, Minn.

For the lighter lifts, the ballast can be equalized most economically at the time of unloading by adjusting the ballast plow so as to spread an equal amount of material inside and outside of the rails.

Where heavy lifts are made, the amount of material which can be unloaded inside of the rails is limited to the level of the top of the rail since it is not practical to fill the centers above this point.

Where it is not possible to unload sufficient ballast inside the rails, a ballast equalizer should be used ahead of the ballast gang.

Where the ballast is properly equalized and the cribs are full inside and outside of the rail, it is not necessary to use the two men ahead of the production tamper to adjust the ballast.

Use machines

By L. G. LAWSON Roadmaster Canadian National Melville, Sask.

The general practice of working two laborers just ahead of the production tampers to fork ballast to the inside of the rail is not necessary at all.

In many cases I have used two laborers just ahead of the production tampers to shovel ballast on the outside of the rail, to knock down with a hammer any track that was tamped slightly too high and to clean off the ties ahead of the hammering. Again I state that, with the newer type ballast cars and ballast equalizers, this is not even necessary and certainly in well-planned and executed ballast unloading there never should be the necessity of men throwing or moving ballast ahead of the production tampers.

Even with small sags in the track, especially if it is staked ahead of the production tampers, or with a good supervisor in charge of the unloading

and planning, there should be enough ballast unloaded in the centers to take care of all the needs of the production tampers. With the newer ballast equalizers they can easily be run ahead of the lift and put the ballast where required much cheaper than by using laborers. Ballast distributors, newer type ballast cars and the proper use of same should eliminate the use of laborers for this work.

Properly unloaded ballast needs very little help from the ballast equalizers and one can in most cases look after the needs of putting ballast in the center of the track, or taking out ballast as the case may be, and still have plenty of time to do the trimming behind the tamper. Good supervisors make good use of machines and this is one way that a ballast equalizer can aid us.

Most of the time

By E. W. KNIGHT General Foreman Track Pennsylvania Marion, Ind.

I would say "yes," if the ballast is spread as evenly as possible with the work train, and then using a ballast-equalizing machine ahead of the raise. We use such a machine to pull ballast from the shoulders onto the tie ends, and to pull ballast ahead into the holes, sometimes making four or more passes with the ballast boxes.

By using the plow, ballast can be distributed evenly inside and outside the rails. Sometimes, where we have shy spots between the gage, we reverse the plow and pull ballast ahead into the shy spots. Kink

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I have found this to be the best method for a 1½ to a 2½-in raise. But, regardless of how evenly the ballast is spread and distributed, if the track runs extremely out of cross level or has extremely low joints, a certain amount of ballast will still have to be forked to the tamper.

Use enough ballast

By R. D. JACKSON Track Supervisor Illinois Central Clarksdale, Miss.

Yes. This could be accomplished by either placing more ballast inside rails when unloading new ballast or by using a ballast equalizing machine.

I feel that new ballast is preferred because in most cases it is necessary to unload ballast after raising track to bring the ballast section up to standard anyway, so why not unload the ballast before raising? This will give you new ballast with which to tamp track and enough left over to have a standard ballast section.

Where the ballast section was not brought up to standard after a previous surfacing, approximately five cars of ballast per mile will give sufficient ballast for an average raise of one and one-half inches and enough will remain to give a standard ballast section.

Generally speaking, track can be raised another time without additional ballast being needed.

Handling of sun-kinks

What prior "signs," if any, indicate that a sun-kink in roll is imminent? What conditions contribute to the occurrence of sun-kinks and how can they be avoided? What are the proper steps that should be taken to restore correct line and surface after a sun-kink occurs? Explain in detail.

Line in "S" curves

By C. A. HAGEN Supervisor of Track Illinois Central Memphis, Tenn.

Sun-kinks comprise a problem that must not be overlooked or taken lightly.

The greatest danger comes during

the period of rapid change in temperature from cool to hot. Two very important actions that should be taken in connection with a sun-kink are, during the first warm days, to patrol the track during the heat of the day and to observe the condition of the track.

Some of the "signs" that would indicate a sun-kink is imminent are:

Kinky line, heel of switches kicked out of line, and tight track coupled with open frozen joints or with no joint expansion remaining in the joints. The close inspection should be continued until after the weather has become stabilized and the track has had time to adjust itself. The first few hot days will let you know where there is any danger of sun-kinks.

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At places where it is noticed that the track is tight, close watch should be kept of such locations during extremely warm weather. If indications are that such places are apt to sunkink, they should be immediately protected by a slow order until arrangements can be made to correct the trouble.

Sun-kinks are caused by:

(1) Rail creeping and expansion, resulting in tight rail.

(2) Skeletonizing track, or leaving track partly filled with loose ballast.

(3) Raising and lining track in extremely hot weather, especially at the foot of heavy grades, in sags and in cuts.

(4) Leaving or inserting a stretch of light ballast between longer stretches of heavy ballast

Sun-kinks may be avoided by the following procedure:

(1) Before disturbing the track, make a careful examination of the rail expansion for some distance on each side of the place where it is proposed to start work to determine the average amount of opening at the joints. If there is not sufficient opening between the ends of the rails in the immediate vicinity to take care of expansion, short rails must be put in to absorb the expansion during the progress of the work. If there is sufficient opening at the joints for this purpose, bolts should be loosened and any frozen joints knocked loose to allow the rail to adjust itself, especially on rail laid during the winter period.

(2) Skeletonize the least amount of track necessary for the work to be done. Protect

it by slow orders.

(3) Don't disturb the track during extremely hot weather at locations where there is a tendency for sun-kinks to form.

(4) Work against the direction in which the rail tends to run, wherever possible.

The safe course must be taken in handling track and bridge work where there is a possibility of sun-kinks. Do not take any chances, as the danger is greater when a train is moving over the tracks than at any other time.

If a sun-kink occurs and temporary relief is necessary, a reverse curve or letter "S" effect can be lined in tangent track, and curved track may be lined toward the outside. This, of course, is only temporary and trains should be slowed down to meet the occasion. The track should be put back to its former line as soon as possible by

driving the rails back for proper expansion, or permanent relief provided with shorter rails if necessary.

Use switch points

By L. G. LAWSON Roadmaster Canadian National Melville, Sask.

While most sun-kinks happen "all of a sudden" in most cases the signs and reasons are quite evident to the trained eyes of any experienced trackmaintenance man.

I would state without fear of contradiction that, on rail of 85 lb per yd or heavier in track with fairly full cribs, sun-kinks occur in most cases when the track is being surfaced or when spikes are pulled out-of-face in lengths of 20 ft or over. Furthermore, excepting in very extreme cases, sun-kinks do not occur before noon on the average day.

Sun-kinks usually occur in cases where steel is running due to lack of anchors, insufficient anchors, or where steel has been laid too tight with too little expansion. Sun-kinks also occur in track with proper anchorage and proper expansion but when the joint bolts are too tight. While it is desirable that bolts be as tight as necessary, it is also necessary that the same tension be on all joints. This is also desirable because the joint that moves gets pushed too tight in hot weather and the rail overflows and chips. Also, in severely cold weather it breaks apart and causes damage to the rail, to say nothing of the danger.

Sun-kinks sometimes occur on lighter rail, even if the cribs between the ties are full, and the track sometimes goes straight up instead of sideways. This usually happens only in running steel. Fairly full cribs tend to hold the track in place and keep the rails cooler.

When the above-mentioned undesirable conditions exist, the track must be worked, even in hot weather. It will be noted that small kinks usually occur at first. If these small kinks do not relieve the tension then a large kink occurs. The proper procedure to restore the track to its proper location after a sun-kink depends entirely on the condition of the track.

If rail has been laid too tight the proper solution is to cut the rail. Only one rail may be tight, but more often than not both rails need to be cut in such circumstances. Cutting is the most undesirable solution and, with the trend to frozen joints and continuous rail, cutting should be only a last resort. Many times I have seen rail cut, then it had to be replaced with the proper length even by the following morning. Cut rails are a headache at all times.

If the steel is tight and the sun-kink occurs before the hottest part of the day, and if it appears that the track would be okay when the weather cools off a bit, I would break the rail joints and use a switch point until later in the evening, then line the track back to its proper place with the rails being left intact. Rather than cut the rails where the steel has been running, switch points should be used and then the rails can be driven back to their proper location later. It is surprising how quickly steel can be driven back.

A good point to remember is that, if a sun-kink occurs before the heat of the day, cutting the rail or using switch points is necessary as the condition will get worse as the day gets hotter. If the sun-kink occurs in the afternoon, then by all means try to avoid cutting a rail.

In lining back a sun-kink, the proper method is to make a long curve or bend in the track and gradually line it out, starting at the center and working gradually to both ends. However, it must be remembered that at no time must the track be suddenly jerked or moved too far at any one point. When doing this the ballast cribs should be filled and the ties covered with ballast to prevent the rail from again kinking. It is surprising how large a sun-kink can be lined back without cutting any rails at all. It is also surprising how quickly the filling of the ballast cribs seems to cool off the rails.

Joints with no expansion where there should be expansion, joints with bolts too tight when not required, and running steel are the causes and small kinks are the warning. Do not touch such track on a hot day.

Causes and effects

By F. E. HUDDLESTON General Supervisor Track Chesapeake & Ohio Huntington, W. Va.

There are definite prior signs to indicate that a sun-kink in rail is imminent. These are:

(1) The first noticeable sign is that the

What's the answer? (cont'd)

rail joints or ends are extremely tight and all expansion has been absorbed. However, this indication is not apparent if the joints are frozen due to excessive bolt tightening.

(2) Small kinks in track which indicate

a bad line.

(3) Inability to keep the track in line.
(4) Movement of rail through the rail anchors.

(5) An insufficient ballast section which allows movement of the ties.

The following conditions contribute to the occurrence of sun-kinks:

(1) Insufficient anchoring.

(2) Failure to record rail temperatures when new rail is laid.

(3) Rail laid without proper expansion shims.

(4) Insufficient ballast section.

(5) Frozen joints.

These conditions can be avoided by:

 Close supervision over the laying of rail and close inspection afterward to insure that standard policies and instructions are adhered to.

(2) Proper shimming at all times.

(3) Recording the rail temperature when laid and keeping the records for future reference.

(4) Applying sufficient anchors to prevent any movement of rail.

(5) Maintenance of a sufficient ballant section at all times.

(6) Testing bolt tension with a calibrator or torque wrench to prevent frozen joints.

(7) Anchor-spiking extremely sharp curves, if necessary.

In order to restore correct line and surface after a sun-kink occurs it may be necessary to apply additional ballast. It may also be necessary to remove small sections of rail 3 to 6 in long—in some cases more.

In some instances it may be necessary to apply additional anchors. Occassionally it helps to loosen joints that are frozen and re-aline track.

Why build culvert headwalls?

Under what conditions is it necessary to provide headwalls at the ends of culverts? What are their advantages and disadvantages? Explain.

On all culverts

By G. P. HAYES, JR.
Engineer of Construction
Richmond, Fredericksburg & Potomac
Richmond, Va.

Assuming that all culverts are installed to carry water from one side of a track to another under any type of fill, either high or low, it is my firm opinion that such culverts should all have headwalls. As a matter of fact, there are quite a few instances, depending on the height of the fill and the looseness thereof, where culverts should also have wingwalls. My reason for this opinion is based primarily on the following observations over a period of time and I have seen many culverts with and without headwalls.

By using a headwall and/or wingwalls on a culvert, it is less likely to become choked with weeds and brush and other debris. The headwall and/ or wingwall also prevents the fill from running over the end of a pipe, presenting the possibility of clogging the waterway. A headwall will also protect the ends of the pipe from damage by right-of-way mowers and will make culverts easier to locate in high weeds.

Culverts should be cleaned periodically, particularly at the outfall end. If cranes are used for cleaning these culverts and opening the waterway, a headwall and possibly wingwalls will provide a good starting point for the cleaning without leaving a hole for the fill to run in and eventually clog the

outflow end. Most headwalls could be made of secondhand treated ties and will last for years without any particular attention. But, regardless of what material is used, I contend that each culvert should definitely have headwalls.

Gives slope protection

By H. J. WILKINS Division Engineer Northern Pacific Glendive, Mont.

The primary use of a headwall or tailwall is to shorten the length of the pipe required and still maintain a proper shoulder distance from the center of the track.

The most common physical restriction, at least in the more mountainous and hilly regions of the west, is the case where the track is located immediately adjacent to a river and extremly rough and mountainous bluffs are adjacent on the opposite side of the track. In such cases, headwalls are economical and often the only solution for providing a proper inlet in narrow track ditches. A tailwall on the river side will also shorten the length of pipe required, as well as give better protection from high water and potential ice damage.

In cases of extremely fast run-off or in potential cloud-burst areas, it is often necessary to provide headwall and tailwall protection on a pipe to prevent excessive scour or wash, especially in sandy and loose soils. This protection can also be obtained by the use of riprap where the terrain and waterway would involve a headwall of extreme length or height.

During improvement programs such as bank widening, we will often find culverts that are too short for the improved shoulder widths. We must either extend the culvert or provide a new headwall or tailwall to obtain the proper shoulder width. The advantage of the headwall is that it provides better end protection and better clearance in tight locations as mentioned above. Disadvantages are the increased labor costs involved in setting up forms and moving in materials and in the additional tools required. In any event, all of the problems and costs should be evaluated before a final decision is made.

Not on pipe culverts

By M. J. HARP B&B Supervisor Missouri Pacific Poplar Bluff, Mo.

The use of headwalls on culverts is necessary to protect the fill from caving in around the end of the culvert and filling the waterway. They are also used to protect the fill from caving in when there are heavy rains and high water, as well as for cutting the length of the culvert down to a minimum. The latter could result in a large saving.

I think the use of flared-wing walls in most cases is most satisfactory. The wingwall should extend out to the toe of the fill, with the flared wings built

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on 11/2 to 1 slopes. Also, the culvert should have a headwall on each end about one foot high to protect the fill at the end of the main culvert.

I do not believe it is necessary to have headwalls on pipe culverts as the pipe should be long enough to reach to the toe of the fill.

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By H. M. HARLOW Assistant General Supervisor Bridges & Ruildings Chesapeake & Ohio Richmond, Va.

Headwalls are necessary at times when it is impractical or impossible to extend the culvert when such is necessary. It is generally better practice to lengthen the culvert, if possible, because when a headwall is necessary to hold the fill it will probably be a large. expensive one.

Prevention of scour and undermining is another reason for building headwalls. This could be a necessity at either the inlet or outlet end, or both. The flow of water into the pipe might undercut the inlet end and wash away the fill below the outlet end. Occasionally the outlet end might be subject, to scour from the stream into which the culvert empties and a headwall or cut-off wall might be necessary. Local conditions will have to govern whether or not headwalls are necessary.

Headwalls on the inlet end will sometimes improve the carrying capacity of the culvert by funneling the

water into the culvert. This provides speedier run off and drainage of the water above the inlet end of the culvert. This is very desirable when the land adjacent to the stream is subject to flooding.

The seepage of water around the walls of the culvert can be eliminated or greatly reduced by a headwall on the inlet end. This is also true for the outlet end when the water into which the culvert empties is high around the end of the culvert.

When the culvert pipe might pull apart at the joints due to unstable fill conditions, heavy headwalls will prevent this. Joints pulled apart will allow the fill to fall into the pipe, causing holes to develop in the fill and eventual blockage of the flow in the

New roof or patch?

What factors determine when it is no longer economical to patch or repair roofing and when a new roof is justified? Explain.

Time to do something

By A. B. WANG Supervisor Bridges & Buildings Monon Lafayette, Ind.

It is assumed reference is made to a built-up roof on important buildings and single-roll roofs on less important

When the top surface loses its shine, the material becomes dead looking, cracks start appearing, and nails loosen up. It is then time to do something. If the nails which have loosened under the laps can be driven to hold, the checks and cracks can be covered with a roof mastic and all of the surface recoated with a good roof paint.

If nails do not hold and the wood sheeting underneath gets springy and shows indications of decay, it is best to start all over and put on new sheeting with new roll or built-up roofing on top. The sunny sides of roofs give the greatest trouble. Alternate freezing and thawing in winter are hard on flat roofs and cause expansion cracking. In many such cases it is impossible to prevent some water from stand-

Gravel roofs give longer life but, when rolls under the gravel start bulg-

ing and showing bare spots, it becomes impossible to repair and regravel these spots. The top coat must be removed and replaced.

All gutters and downspouts should be kept clean, particularly where there is soot accumulation from the use of fine coal. All flat roofs should have enough pitch and adequate gutters and downspouts to prevent holding water.

Dry-climate roofs

By F. DURESKY Supervisor Bridges & Buildings Chicago & North Western Huron, S. D.

It has been my experience that, if tar-and-gravel roofs and roll-roofing roofs are in need of repairs, the application of any of the various kinds of mastic coatings is only temporary. They last until the first cold weather, then expansion and contraction again opens the material and leaks continue.

But, I have had good results on slate shingles, cedar shingles, tar-andgravel roofs and ordinary roll-roofing roofs by first thoroughly cleaning the old roof, applying a brush coat of mastic and then applying a covering of 55-lb roofing. We also have applied 55-lb roll-roofing over an old roof without mastic, using 1-in by 2-in wood stripping to hold the roofing securely, because we get high winds in this Dakota country and roofs must be properly applied to take care of that condition.

For renewing roofs, composition tab shingles will last for many years if they are properly applied by stapling the lower edge of the tabs. But, because of the dry weather, cedar shingles and slate shingles will outlast all

Available money

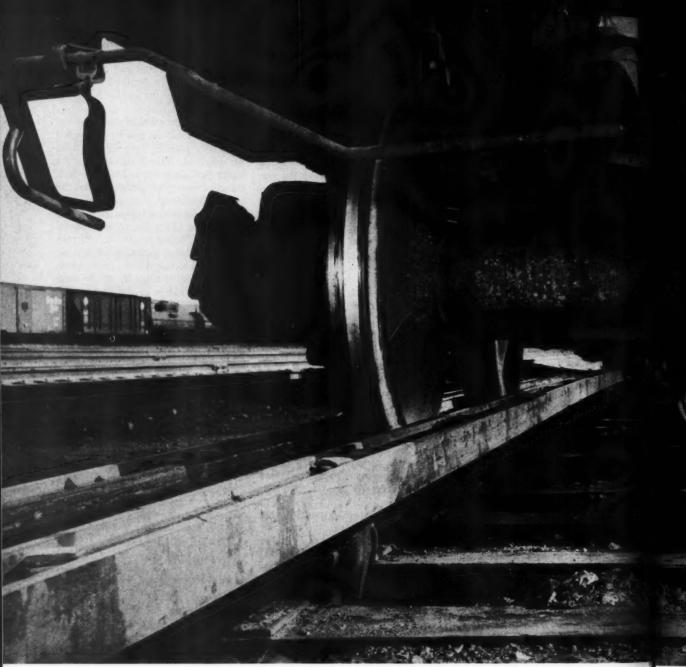
By J. A. JORLETT Area Engineer - Structures Pennsylvania New York

The determination to patch or repair roofing or renew it in its entirety will be decided by many managements today on the number of available building repair dollars allocated and according to the urgency of the repairs or losses accruing due to the deferment of repairs.

The supervisor who maintains building roofs must know what techniques are in vogue to extend the service life of the roof covering. Generally roof coverings will fall into two classes:

- (A) Built-up roofings
 - (1) Smooth-surfaced (2) Gravel or slag surfaced

(Continued on page 44)



The Racor Mechanical Car Retarder applies braking force to both sides of every car wheel that

No skates needed here!

NEW RACOR® MECHANICAL

CAR RETARDER*
IS COMPLETELY AUTOMATIC!

*(Patent Applied For)

No skates or skate men are needed in gravity classification yards with this new Racor Mechanical Car Retarder at the end of each track! The consequent reduction in operating expense will amortize the cost of the retarders in a short time. Still further savings accrue from reduced damage to lading through absorption of impact as cars come together.

The Racor Mechanical Car Retarder has been designed to bring rolling cars to a stop at the end of gravity classification yard track and to resist their further movement by the impact of succeeding cars. The

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enters it. Once adjusted, it needs no further attention-operation is completely automatic.

retarder consists of spring loaded rails which apply retarding force simultaneously to both rim and flange of each pair of wheels. It applies opposing forces in such a way as to eliminate the possibility of derailment. Retarding action is entirely mechanical, and no difficulty is encountered in moving either the cars or the locomotive through the retarder when the track is being "pulled".

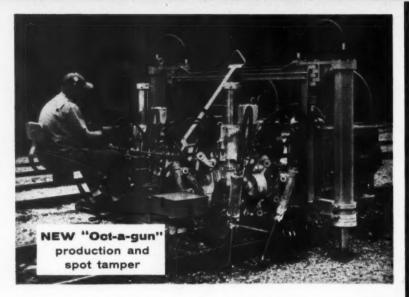
Your American Brake Shoe representative will be glad to make a study of the operation of *your* yard in order to determine the savings that can be derived from the installation of Racor Mechanical Car Retarders. American Brake Shoe Company, Railroad Products Division, 530 Fifth Avenue, New York 36, N. Y.



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Quality products cut your ton-mile costs





Tamp 300 feet per hour with 35% less capital investment



SPOT TAMPER



IIT TAMPER





RAIL DRILL

Here's a production tamper that out-tamps or equals the normal continuous tamping output of other machines that cost from one-and-a-half to four-times its price. Racine "Oct-a-gun" also jacks the track as it tamps, eliminating the need, time and manpower for a separate track jack.

"Oct-a-gun" tamps one or both ends of tie . . . stabilizes ballast at honest rate of 180 ties-per-hour. It tamps uniformly at every tie with hydraulic-powered, 1160 high-impact tamping blows per minute. One operator works twin 4-tool heads, tamping as solidly as desired . . . from directly below the rail base to 18" either side of rails. Integral hydraulic jacks with positive rail-grip and powerful, big-diameter cylinders provide smooth raise with clear sighting. Fast-starting hydraulic motors propel the machine from tie to tie . . . and move it to-and-from job or switch at 12 mph. Machine is powered by two 18 hp gas engines, can be removed from tracks in three minutes on standard prepared set-off.

Clip and mail the coupon for location where you can see "Oct-a-gun" tamper at work . . . or check for literature on any Racine machine.

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RAC	INE
RACINE	HYDRA

RACINE H			 	NE, W	
Send literatur applicator [] [] Rail drill		_	-		_
Where can I	see.			of machine	
Name			 	Title	
RR or Co			 		
Address			 		

What's the answer? (cont'd)

(Continued from page 41)

(B) Component types

(1) Tiles or slate (2) Wood, asphalt or asbestos shingles

(3) Roll roofing

(4) Metal

The latter group needs little discussion because worn, broken or missing components are readily detected. They may be replaced by similar materials or substitute items to preserve the function of the roofing. The appearance of the patched roof or the repetition of service calls to make repairs will usually settle the question of continuing to make piecemeal repairs or replacing the entire roofing.

The service life remaining in builtup roofings is not so readily determined. Roofings are engineered practically for 10, 15 or 20-year lives. It is common for many manufacturers to guarantee their roofs for these service

lives.

The service life will depend on the quality of construction materials, workmanship, method of construction, and environment to which a roof is exposed. The adverse environmental factors, in order of their importance, are ultraviolet light, oxygen, moisture. temperature, wind and contaminants in an industrial atmosphere.

Unfortunately many roofs are forgotten until leaks are reported. Where performance bonds or guarantees are in effect, we are lulled into a false sense of protection, and deterioration gets up a full head of steam.

The smooth-surfaced built-up roofing will show signs of distress either by alligatoring or the presence of small pin blisters. The former is due to the hardening or shrinkage of the asphalts or bitumens while the latter is due to the presence of water vapor which finally escapes through the coat-

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If these conditions persist for three to five years, water-carried micro-organisms attack and penetrate the felts. Felts are intrinsically water-absorbent, so it is vitally important that moisture be kept away from them. Certain types of insulations which are placed below the coverings will also be damaged by moisture and the micro-organisms.

For many years it has been the practice to apply a coating to smoothsurfaced roofs at intervals of five years or so, the theory being that the origi-

272 JACKS & PULLERS / SIMPLEX

to choose from!

MOST COMPLETE LINE

Hydraulic Jacks & Pullers



STANDARD HYDRAULIC MCKS 11 Models 1½ to 100 tons capacity 51/4" to travel

to 22"



"IENNY" CENTER-HOLE HYDRAULIC PULLERS 6 Models 30 to 100 tons capacity 314" to 10" travel

"RE-MO-TROL" PULLERS Solid and Center-

39 Models 10 to 300 tons

Also Foot-Lift Hyd. "Rol-Toe" Jacks, Bumper and Service Jacks, 2 & 3-Grip Pullers and Hand and Powered Pumps

45

Lever Jacks

Also Pole-Pulling, Reel, Tim-ber, Cable & Wire Tensioning, Pipe Pushing & Pulling, Tie Remover, Tie Replacer, and Siding & Flooring Jacks.



SINGLE ACTING RATCHET LOWERING

11 Models, 5 to 20 tons capacity. Full capacity on toe or cap.



CEARED IACKS

3 Models, 25 to 35 tons capacity



TRACK (TRIP) IACKS

13 Models (Five aluminum altoy) Single and double acting.

146 Screw Jacks



SCREW JACKS 4-WAY HEAD -19 MODELS

10 to 24 tons capacity. Ball bearing, Malleable Housing, Safety peep hole.



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15 to 50 tons capacity. Powerful, light, low height.

TRENCH & TIMBER BRACES

22 Models. Drop-forged steel—1½" & 2" dis. screws. Adapt to any width of trench.



Other screws types. Ratchet Head Planer and Reel Jacks; Push-Pull and Shoring Jacks; Steamboat Ratchets & Load Binders: Mine Reof and Timber Jacks, Rail Puller & Expander, and Gear & Wheel Pullers, Bumper Jacks.

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Mechanical Jacks: Catalog Mech. 60 Hydraulic Jacks: Catalog Hyd. 60 TEMPLETON, KENLY & CO. 2543 GARDNER ROAD BROADVIEW, ILLINOIS

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WORK POWER PAYS!

When a BURRO goes to work - in the yard or on the line — it delivers fast, low cost performance. Equipped with bucket, magnet, hook, tongs or dragline bucket, a BURRO is ready and able to do the hundreds of odd jobs railroad work calls for. Fast travel speeds (up to 22 mph.) and heavy draw bar pull enable the BURRO to move itself and a work train or cars to the job in a hurry. Once on the

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job, a BURRO wastes no time getting the work done. BURRO's work power pays dividends every

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SYLVESTER STEEL PRODUCTS CO., LTD. LINDSAY, ONTARIO







1960 Ford F-100 Equipped with the



Minimum projection at either end allows for the use of such secondary equipment as snow plows, trailer hitches, winches, etc. This complete unit, including installation costs and major accessories, sells for only

3275

RAIL-ROAD VERSATILITY!

Many people in the railroad industry are of the opinion that the application of rail/highway equipment is restricted to a very few makes and models of passenger vehicles and light trucks. The versatility of the Rail-Road Conversion Unit dispels that opinion. In only a few cases—where the vehicle's tread width is excessive — is it impossible to adapt a highway vehicle for on-rail/off-rail use.

As an example, we have made (or are in the process of making) Rail-Road Conversion Unit installations on these 1960 model vehicles: TRUCKS—FORD, CHEVROLET, DODGE, JEEP FC-150 AND FC-170, JEEP TRAVELER, GMC AND INTERNATIONAL; PASSENGER CARS — CHEVROLET, BUICK, PLYMOUTH, DODGE, OLDSMOBILE, MERCURY AND FORD.

If your line is planning the purchase of on-rail/off-rail equipment, consider the Rail-Road Conversion Unit. Factory-trained sales engineers can provide literature and drawings to show how the simple, fool-proof Rail-Road Unit can be installed on your exact choice of equipment.

NOW READY — The Big Boy Conversion Unit for heavy trucks and other on-rail/off-rail maintenance-of-way vehicles of up to 45,000 lbs. G.V.W. Available with manual or hydraulic actuation mechanism to fit your specifications. Demonstration schedules are now being arranged.



CANADA: Sylvester Distributors Ltd. Kent at Victoria Lindsay, Ontario

EXPORT: Electric Tamper Export Co. 205 W. Wacker Drive Chicago 6, Illinois

(224

What's the answer? (cont'd)

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nal water-sealing coating would be restored and the felts rejuvenated. More recent theories dispute this because it has been found that penetrating bitumens do not resaturate the felt. A built-up roofing provides a pliable felt membrane between the roof deck which has movement due to the stresses of expansion and contraction, and the water-sealing coat which should remain firm. The under felts are light in weight so as to form a smooth stress-free surface. It is here, then, that the hidden deterioration occurs and interferes with the function of the roofing.

Repairs can be made properly in this instance by applying a new reinforcing felt and proper bitumens for the tacking and sealing coats. A slag or gravel roofing complicates the work because of the expense of removal. For complete roofing removals it usually costs 50 per cent more to remove slag or gravel roofing than a smooth-surfaced roofing.

Maintenance is key

By P. R. CICCOLILLI Supervisor of Bridges & Buildings Central of New Jersey Jersey City, N. J.

Consider for economical feasibility of repairs, or justification for a new roof, the typical built-up roof of 4 or 5 plies of felt, having either coal tar or asphalt as its bonding agent, topped off with either slag or gravel.

The majority of roofs in the above category do not actually wear out if they are properly maintained. A great factor that will cause a roof to disintegrate is the hot sun. The rays, beating upon the surface year in and year out, cause the volatiles in coal tars and asphalts to evaporate, which results in the bonding agents becoming brittle. Consequently, the felt plies lose their oils with the result that they lose their pliability and elasticity. When in this stage, the felts, because of their brittleness, crumble easily and function in a manner similar to a blotting paper, i.e., absorbing instead of resisting moisture.

When roofs reach the condition where felts are no longer elastic, cracks form in the roof mat. Also noticeable are numerous bare spots where slag or gravel previously ex-

RAILWAY TRACK and STRUCTURES

isted. One of its functions, besides prevention of surface erosion, is to help retard the drying out of the volatiles from the bonding agents. Bareness indicates loss of the bonding power of the surface coat.

In conclusion, it can be stated that roofs which show the above features have reached the state of advanced deterioration, and it would be uneconomical to consider anything but a new roof.

Like other portions of a structure, the roof should be placed foremost for inspection. Unless one knows or hears complaints of leaks, little or no means are taken to check the roof surface. It would be good practice to check at least twice a year—preferable periods would be after the winter and the summer seasons.

In this manner, the first appearances of blisters and checks in the roof mat can be readily attended to. Lifted seams can be cemented back into place before being torn by the winds. Bare spots can be recoated. Also, it is important to note low spots of a roof deck, which are locations of improper drainage. Such areas, if not readily adjusted, go through deterioration faster than the surrounding area.

Equipment operators' responsibility

To what extent should operators be permitted to make "minor adjustments and repairs" to their machines? Where does the operator's responsibility in this regard cease and the mechanic's begin? Explain fully. How is this separation of responsibility controlled?

Depends upon individual

By J. T. SHEPHERD, JR. Roadmaster Norfolk & Western Buena Vista, Va.

Practically all operators are somewhat mechanically inclined or they never would have sought the positions they now fill. Naturally some are more so than others. All operators are an-

(Continued on page 50)

FIND TROUBLE SPOTS...



5 hp Ka-Mo drill used to locate trouble area in railroad fill. Easily portable, sets up quickly. Despite small size, drill has high torque characteristics — can drill hole sizes up to 20".

and fix them quick with a KA-MO DRILL



Same drill as above drills sixty-foot horizontal hole for "French-drain." Drill diameter is 12". When hole is completed, drill motor is reversed and used to convey gravel, sand, and ballast to facilitate drainage.

Your Ka-Mo drilling specialist has a complete line of quality equipment, plus the field know-how to help save time and cut drilling costs. Drill sizes range from 2" to 48" in diameter, and larger. Call in your Ka-Mo man, he's a good man to know.



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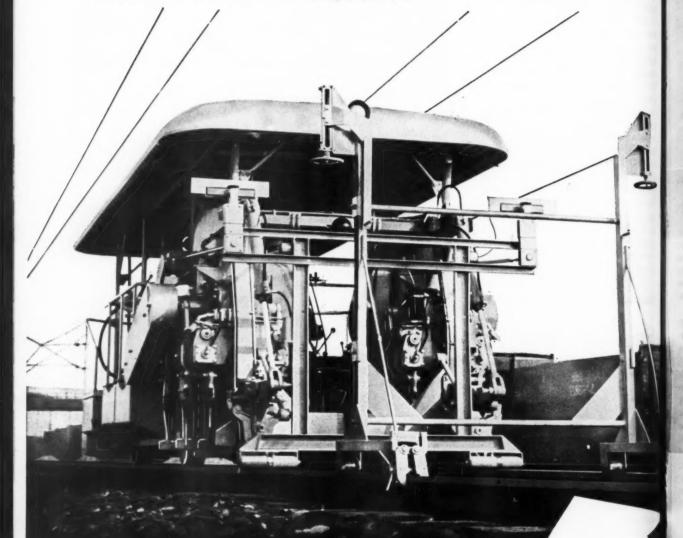
— covers drill selection, boring capacities, and latest developments in drilling technique. Write today!

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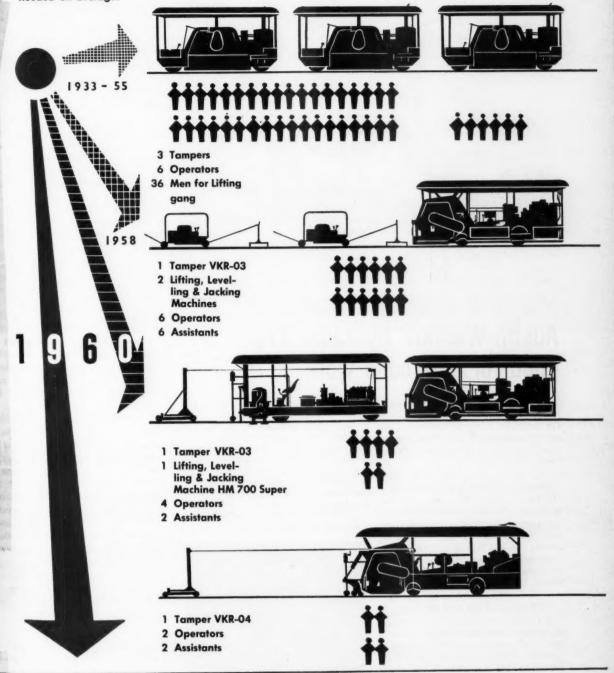
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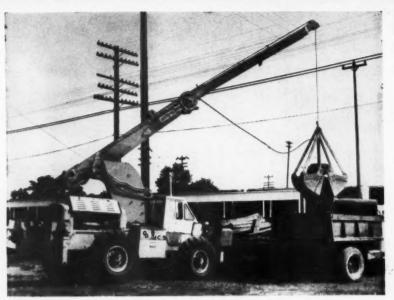
To tamp 1150 ft. of track per hour one needed on average:



For the first time ever Sighting, Lifting and Tamping with ONE machine. Perfect track condition by the tracing method. Maximum economy, Simple Operation.

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Model 210 A-W Hydraulic Crane, equipped with clamshell attachment on 10-ft. boom extension, performs yard maintenance work at the C&O's Plymouth Yard in Michigan.

C&O terminal supervisor of track says:

Maneuverable, maintenance low . . . Austin-Western Hydraulic Crane good for all-around work

"The Austin-Western Hydraulic Crane is a good all-around piece of equipment for railroad terminal maintenance work," comments Harry Haines, supervisor of track of the Chesapeake & Ohio's Detroit Terminal.

Goes anywhere to do anything

Mr. Haines adds, "This piece of equipment is very versatile and has no trouble navigating over rough terrain or railroad tracks. We use it as a crane to unload ties and handle rail and other track material, and at times attach a %-cu.-vd. bucket for redistribution of ballast, cleaning ditches, etc."

All-wheel drive and steering

Learn more about versatile A-W hydraulic cranes. Telescoping booms swing 360°. Self-propelled, rubber mountedgasoline or diesel powered. 5 models-110, 210, 210-P, 220 and 410. All-wheel drive and steering assure plenty of power and traction . . . outstanding

maneuverability. Also available for truck or stationary mounting.

Rail crane attachment optional for on-or-off track operation. New disconnect clutch, optional with Ford 332 gas engine, permits road speed of 35 mph plus! Attachments include remote control maintenance platform, orange peel and clamshell buckets, magnet, and load-carrying platform. Contact your Austin-Western distributor today for full information or write to us.



Keeps yards, terminal areas extra clean-A-W Motor Sweepers in 2-vd. and 4 plus-vd. models.

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL. BALDWIN · LIMA · HAMILTON

· Road rollers · Motor sweepers

Hydraulic cranes

What's the answer? (cont'd)

(Continued from page 47)

xious to keep their machines out of the repair shop as a machine down for repairs usually means an operator furloughed until the machine is operative again. With this thought in mind, the ambitious operator will study his particular machine and endeavor to keen it in near perfect condition.

There are a few operators who have trouble diagnosing and correcting the simplest ailments of their machines, while others if given the parts can perform almost any repair. These are extremes of course. We require our operators to make any simple repairs that may be required, that is, replacement of any external parts that can be made without possibility of damage to the machine.

All operators have parts books and, in most cases, these books adequately explain the method of making adjustments and replacing worn or broken parts. When, in the opinion of the operator, a repair job is involved that may require tools he does not have. and there is doubt as to his ability to perform such repairs, a mechanic is sent by truck. If possible, he repairs it on the spot, or orders it to be shopped if he cannot do so.

The supervisor under whom the operator works must keep in close contact with all machines. He must know about what to expect of his operators, and how far to let them go with their repair work. In most cases the operator can contact the supervisor by phone, sometimes with the mechanic called in on the line to listen, and the entire procedure outlined so that all concerned understand what is required and what is expected of the operator.

By keeping such contact we are able to keep our machines operating at maximum efficiency and maintained in a clean and orderly manner.

Biographical briefs

(Continued from page 10)

engineer at Moncton in 1956. He was further promoted to terminal construction engineer there in 1958, the position he held at the time of his recent promotion.

Lucien G. Ball, 46, who was recently promoted to supervisor track on the Chesapeake & Ohio at Walbridge, Ohio (RT&S. Feb., p. 10), was born at Adams, Ky., and received his higher education at Union Col-

BETTER



This secondary line track of the Western Maryland Railway was treated with Du Pont "Telvar" at 15 lbs./acre in combination with other weed killers. Note the type of vegetation nearby and the sharp contrast beyond treated area at right.

keep roadbeds clean all season long ... base your weed program on Pont Weed Killers

To clean up weeds and grass on your roadbeds and rights-of-way effectively and economically, use Du Pont "Telvar" monuron or "Karmex" diuron weed killers—either separately or in combination with other weed killers. Just one application of these herbicides controls weeds for a season or longer, cuts maintenance costs considerably. And both provide long-lasting, residual action that often permits lower application rates in succeeding years. "Telvar" and "Karmex" are easy-to-mix wettable powders—and are non-flammable, non-volatile, non-corrosive and low in toxicity to man and animals.

Choice of "Telvar" or "Karmex" depends on soil types and moisture conditions. For information on which one meets your requirements best and assistance in maintaining an effective, low-cost weed control program, write: Du Pont, 2543 Nemours Bldg., Wilmington 98, Delaware. In Canada: Du Pont of Canada, Ltd., P. O. Box 660, Montreal, P.Q.

On all chemicals, always follow label instructions and warnings carefully.



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Weed and Brush Killers

TELVAR' · KARMEX' · AMMATE' X · TRYSBEN' 200 · DYBAR'

monuron weed killer diuron weed killer weed and brush killer

weed killer

fengron weed and brush killer

Biographical briefs (cont'd)

lege. He entered the service of the C&O in 1943 as a rodman in the construction department at Huntington, W. Va., being promoted to inspector at Elkhorn City, Ky., the following year. Mr. Ball was appointed maintenance rodman at Ashland, Ky., in 1945 and assistant cost engineer at Louisa, Ky., in 1947, serving also in that capacity at Columbus, Ohio. He was promoted to assistant supervisor track at Columbus in 1952, the position he held at the time of his recent promotion.

L. F. Schrader, 40, who was recently promoted to district methods engineer on the New York Central at Cleveland, Ohio (RT&S, Mar., p. 10), was born at Oak Harbor, Ohio. He entered the service of the NYC in 1937 as a section laborer. From 1941 to 1945 he served with the U.S. Army. He returned to the NYC in the latter year as assistant foreman, subsequently being promoted to section foreman and extra gang foreman. Mr. Schrader was further promoted to assistant track supervisor at Elyria, Ohio, in 1950, serving also in that capacity at Indianapolis, Ind. He was advanced to supervisor maintenance equipment at Detroit, Mich., in 1956. Mr. Schrader was serving in that capacity at Cleveland, Ohio, at the time of his recent promotion.

Chorles E. McEntee, 33, who was recently promoted to roadmaster on the Elgin, Joliet & Eastern at Joliet, Ill. (RT&S, Mar., p. 10), was born at McGehee, Ark., and completed a correspondence course in civil engineering. He entered railway service in 1949 in the engineering department of the Illinois Central at Chicago, serving also at Waterloo, Iowa. Mr. McEntee was later promoted to asistant engineer of ties and treatment. In 1956 he entered the service of the EJ&E as supervisor track at Gary, Ind., the position he held at the time of his recent promotion.

Dewey C. Gement, 44, who was recently promoted to roadmaster on the Frisco at Amory, Miss. (RT&S, Mar., p. 10), was born at New Albany, Miss. He entered the service of the Frisco in 1937 as a section gang laborer, subsequently serving as district gang laborer and truck driverlaborer. Mr. Gement later was promoted

to section foreman, assistant extra gang foreman, assistant district gang foreman, district gang foreman and extra gang foreman. He was further promoted to assistant roadmaster in 1955, the position he held at the time of his recent promotion.

Cerman H. Wood, 50, who was recently promoted to roadmaster on the Canadian National at Nakina, Ont. (RT&S, March, p. 10), was born in Victoria county. Mr. Wood entered the service of the CNR in 1927 as a sectionman at Manilla Junction, Ont., serving also in that capacity at other locations. He was promoted to relief section foreman in 1936, extra gang foreman in 1942, section foreman, also in 1942, and assistant roadmaster in 1951. He was serving in that capacity at Oshawa, Ont., at the time of his recent promotion.

To the editor

Appreciates coverage of AREA panel discussion

St. Louis, Mo.

TO THE EDITOR:

I wish to express the sincere appreciation of AREA Committee 27 for the excellent coverage in Railway Track and Structures and Railway Age of our panel discussion on the training of equipment operators and mechanics at the March convention. The panel discussion was intended to focus the attention of engineering officials at the convention upon the matter. Your articles resulted in greatly expanded publicity for which we are very grateful.

Your editorial support in the April issue of Railway Track and Structures for most of the ideas and methods discussed by the panel is also appreciated. The supervisory position of "operator-instructor" was proposed by the committee in its report on Assignment 7, Training of Equipment Operators, page 414, Vol. 53 of AREA Proceedings. Other material used in the panel discussion was taken from this report and the report on Assignment 5, Training of Work Equipment Mechanics, pages 503 to 505, Vol. 55 of the Proceedings. Thus, none of the material was particularly

new, but the lack of acceptance by more railroads was felt to require further action

Thank you for the assistance given in our efforts toward the effective and efficient up of work equipment on the railroads.

F. L. Hern Chairmon AREA Committee 17 Maintenance of Way Work Equipment

Association news

Roadmasters' Association; Bridge & Building Association

The annual concurrent conventions of these associations will be held at the Corad Hilton Hotel, Chicago, September 19-21. Detailed schedules of both the joint and separate sessions will be published in the September issue. A skeleton program follows:

Sunday, September 18

1:30 pm — 5:00 pm — Registration, Astoria

Monday, September 19

10:00 am-12:00 noon—Joint session
Greetings from representatives of other as

Address by B. F. Biaggini, vice president, Southern Pacific Company Address by Paul Jones, director of public

information, National Safety Council
2:00 pm-4:30 pm—Both associations will hold separate sessions

Tuesday, September 20

9:30 am-12:00 noon-Joint session Address by H. C. Murphy, president, But lington Lines

Address by J. Handley Wright, vice pre dent, Public Relations dept., AAR Address to be announced

2:00 pm-4:00 pm—Both associations will be separate sessions

6:30 pm—Annual banquet with supply associations

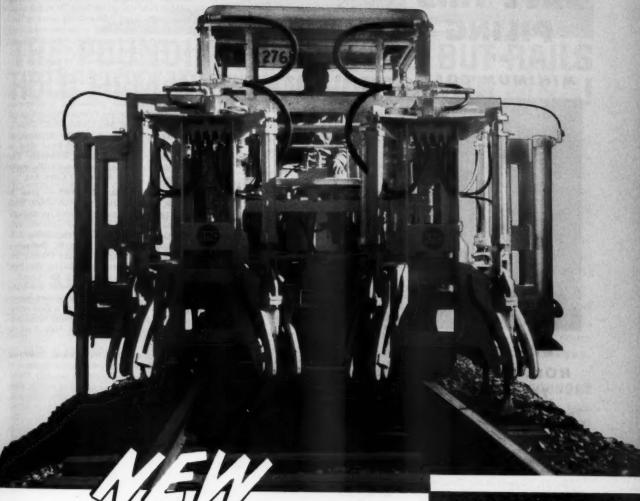
Wednesday, September 21

9:30 am-12:00 noon—Both associations vi hold separate sessions, including elected and installation of officers

(More on page 54)



World's Most Versatile Tamper



McWilliams PURPOSE 8

With ballast compaction equal to the McWilliams Production Tamper, the machine tamps under the tie in sixteen positions—each tool tamping in two places. Speed in production tamping: up to 4 ties per minute. As a Spot Tamper, split head with integral jacks assures effective tamping of joints, low spots, switches and in yard and terminal work. As a Combination Jack and Out-of-Face Tamper, the machine will operate as a jack tamper in making out-of-face raises, finish tamping ties at jacking points. It then can go back and finish tamp the remaining ties—making possible out-of-face tamping with one machine, an operator and a foreman for sighting the raise. Ask for details.

Railway Maintenance Corporation

PITTSBURGH 30, PA.

Track Stays up Longer with a McWilliams Tamper

A PRODUCTION TAMPER

A SPOT TAMPER

A JACK TAMPER



Tools tamp in the same pattern as the McWilliams Production Tamper

Now You Can SAVE THIS PILING

at MINIMUM COST



...with OSMOSE HOLLOW HEART TREATMENT

The secret is flooding the cavity with a highly concentrated, special 24-12 penta solution to refusal under pressure. Decay is stopped cold. Your pilings remain sound and safe for years to come. No other method can match it.

OSMOSE Inspection and Treatment of in-place bridges and trestles is a thorough "top-to-bottom" operation. Pilings, framing, caps, stringers, ties, guard rails and underdecking are carefully checked. Drift pins, brace bolts and hard-to-get-at places are given extra attention with special OSMOSE-developed techniques.

Cost studies show that the OSMOSE in-place treatment averages between 1/20th to 1/40th the cost of replacement... actually pays for itself within the first 8 months of extended life. Get the facts on the quickest way to save money in today's railroad operation. Write: Bridge Inspection and Treatment Division, Osmose Wood Preserving Co. of America, Inc., 989 Ellicott St., Buffalo 9, N.Y.



Association news (cont'd)

Plans made for Roadmasters', B&B banquet in September

Members of the Roadmasters' Association and the American Railway Bridge & Ruilding Association who attend the conventions of these associations in September can be assured that the annual banquet will be an outstanding affair. This assurance comes from officers of the Association of Track and Structure Suppliers which sponsors this annual event for the members of the two associations and their families.

Details of the banquet were worked out at a meeting of the Executive Committee of the ATSS at Chicago on June 28. It will be held at the Conrad Hilton Hotel, Chicago, on September 20, the second day of the three-day concurrent conventions. The method of assigning tables that has been in effect for several years will be continued this year, according to L. E. Flinn, president of the suppliers' group. Under this system, two of the ten seats at each banquet table are occupied by representatives of supply companies who act as hosts to the railroaders present, explained Mr.

Supply trade news

ALLIED CHEMICAL—Thomus W. Collins, Jr., has been appointed manager of agricultural chemical sales for this company's General Chemical Division, according to an announcement by John L. Damon, director of agricultural chemicals.

Mr. Collins has been with the division for 25 years. His positions during this period included those of chief chemist of the division's agricultural chemical plant at Baltimore, Md., and agricultural chemical production supervisor. He was promoted to assistant sales manager in 1951.

A. M. BYERS COMPANY—Victor C. Lawrence, marketing consultant, has been promoted to general manager of sales at Pittsburgh, Pa. Richard I. Enzlon and Rolph E. Whittaker have been appointed product manager of wrought iron and product manager of steel, respectively.

Theodore J. Bacalis has been appointed a field service engineer, with headquarters at Detroit, Mich. Mr. Bacalis was previously associated with the Colorado Fuel & Iron Corp. A. H. McArn has joined the Engineering Service Department of this company. Mr. McArn is a graduate of Carnegie Institute of Technology with a Bachelor of Science degree in electrical engineering.

DEARBORN CHEMICAL COMPANY — This company is embarking on a program calling for the sale of water-treatment chemicals through industrial distributors, according to an announcement by Glen R. Plerce, manager of the newly created Distributor Sales Division. According to Mr. Pierce, who is setting up a national distributor system, Dearborn is seeking to make distributor arrangements in a number of key areas

in the United States. Mr. Pierce said that the first product to be offered is "STOP. PIT," a water treatment for stopping pitting and corrosion in steam and hot water heating systems.

MATISA RAILWELD - Production of long welded rails started on June 20 at this company's new fixed butt-welding plant at Bessemer, Ala., according to an announcement by Robert P. Underwood, vice president and general manager. Purpose of the new plant is to serve the purchasers of new rail produced by the rail mill of the Tennessee Coal & Iron Division of U. S. Steel at Insley, Ala. The welding plant started immediately on a two-shift basis producing quarter-mile strings of rail for the Frisco and the Central of Georgia, said Mr. Underwood. Dedication ceremonies were held for the plant on July 28. This is the second fixed plant to be established by Matisa Railweld. The first, located at Argo (Chicago), Ill., serves the rail mill of U.S. Steel at Gary, Ind.

NALCO CHEMICAL COMPANY — John B. Cruell, area manager of Nalco's New York City office, has been promoted to manager of the Southern California District, with headquarters at Glendale, succeeding J. T. Nicholson, resigned. John H. Gallogher, service representative, Eastern District, has been promoted to manager of the New York City office, succeeding Mr. Cruell.

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RAIL

Mr. Cruell graduated from Louisiana State University with an engineering degree. He joined Nalco in 1955 as a field representative in the Texas District, being promoted to area manager at New York in

THE OHIO LOCOMOTIVE CRANE COMPANY

—The entire locomotive crane business of The Wellman Engineering Company, Cleveland, Ohio, has been acquired by The Ohio Locomotive Crane Company, Bucyrus, Ohio, according to an announcement by Walter J. Michael, president of Ohio. The announcement stated that the transaction, effective June 15, involved both the Wellman diesel-electric locomotive crane and the former Browning mechanical locomotive crane and that Ohio is set up to furnish parts and service to Wellman and Browning owners.

THERMEX METALLURGICAL, INC.—Tod Allea has been appointed a sales engineer for thermit welding, with headquarters at Hammond, Ind. Mr. Allen was formerly with the Budd Company at Gary, Ind. He will serve accounts in Chicago and surrounding industrial areas.

CLASSIFIED ADVERTISEMENT



THE POUNDING IS PITILESS BUT RAILS HOLD FIRM WHEN ANCHORED WITH M&S!

■ M&S Rail Anchor Spring Take-Up is distributed over the entire anchor • provides strong gripping power on rails that are on the low side of rolling tolerance or reasonably worn • eliminates the need for shims. ■ M&S Rail Anchor Anti-Drive End prevents overdriving in normal applications • acts as stop against the fillet joining

the rail base with the web. ■ M&S Rail Anchors are tagged and bundled in groups of 25 for lower handling costs • easier distribu-

tion along the rails. M&S Rail Anchor has lasting holding power good reapplication quality bearing surface on top of rail reduces possibility of damage by a derailed wheel or dragging equipment large bearing surface on tie gives extra protection against creeping ideally suited for welded rails. M&S Rail Anchors

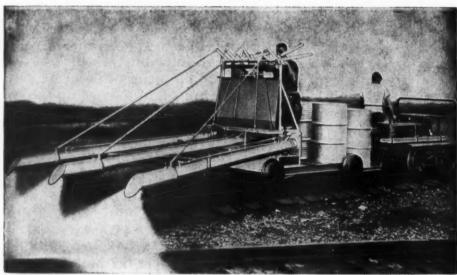
do not need special installation equipment anchor can be installed or removed with maul, sledge or most mechanical applicators.

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Division of QCf Industries, Inc.
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WOOLERY WORKS WONDERS with WEEDS!



Small, light, inexpensive—towed by a motor car, the PB-B is the ideal burner for yard work—and in many cases BETTER than larger burners for on-the-line work. Can be put on the job FASTER! (Three other Woolery burners in larger sizes available).

THE WOOLERY WEED BURNER MODEL PB-B.

> This trailer type weed burn can be towed by motor cw. Three burner clear a swath 15-feet wide on first trip and if required can be widered to 25 feet with burner extended on second trip. Larger sizes available, including self-propelled models.

Millions of dollars have been spent keeping roadbeds clear of weeds and also for keeping retarders and switches open in the winter.

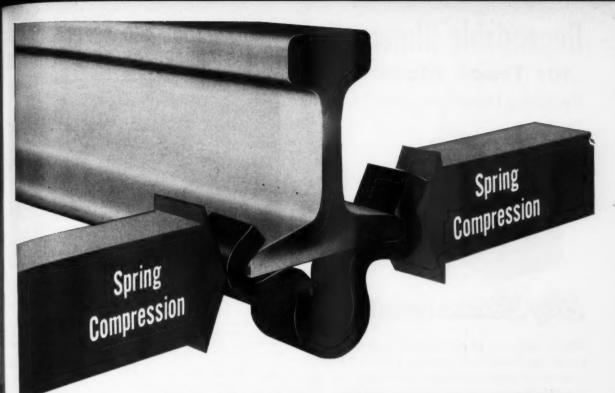
Here is a versatile, flexible yard or on-the line weed burner does WITHOUT FUSS -AND HAS BEEN DOING IT FOR YEARS! A good example of what we mean: it destroys all weeds COMPLETELY

(due to individually controlled burner arms for raising and lowering as required by ground contour) In a 15-foot swath on one trip and-with burner arms extended on return trip-burns a 25-foot swath! YET THE PB-B CAN BE TAKEN OFF TRACK BY ONLY TWO MEN!

For further information ask for folder #170 or send your requirements to . . .

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RAILWA



Powerful Spring Compression and 4-Point Symmetrical Grip make the WOODINGS Advanced RAIL ANCHOR

- * BEST for welded rail
- ⋆ BEST for machine application
- * BEST for reapplication value

GET THE FACTS!



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Requiring Head Lamp and Taillights



Big Beam Lighting Equipment

Ideal for night work on motorcars not equipped with generators. Big Beam Track Motorcar Lighting Equipment consists of portable battery operated headlight with lock-type hold-down bracket, 10' lead wire and either one or two taillights. Control switch on lamp head. Operates on

four standard No. 6 dry cell batteries. For all weather service. Many railroads are using this unit as standard equipment on their track motorcars.



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Model No. 664

Powered by any standard 6-V twin pack lantern battery. Sealed beam head. Available also without flashing beacon.



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Latest clamp-on type-4 models. Powered by one 7½-V dry cell battery. With sealed beam or incandescent type bulb.



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Powered by one standard 6-V lantern battery. With sealed beam or incandescent type bulb. Also available with flashing beacon.

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Safely handles loads to 2000 lbs. All tubular high-care steel construction for trouble-free service. Car breaks as veniently in the center into two sections for easy handling as transportation. Each section can be used as a truck sest. The deck is heavy mesh-expanded steel. Removable hand can be used at either end. Ball bearing cast steel wheels.

Platform Size 48" x 45" Height Above Rail 8" Weight 140 lbs. complete

Write for complete tool and supply car illustrated literature and pine FREE complete catalog shows entire NOLAN railway supply line.

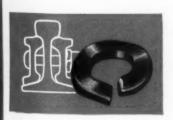
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The reserve power designed into IMPROVED HIPOWER Spring Washers maintains constant bolt tension and absorbs the shocks of heavy traffic.

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Newest of the Mechanical Muscles® for Organized Mechanization is the Nordberg "Trak-Sweeper," used in track raising operations.

Utilizing a rotating impeller with four radiallymounted heavy rubber blades, this dual-purpose machine levels ballast in the track and across the crib area for better ballast distribution ahead of the tamper and removes excess ballast from the top of ties after tamping. The Nordberg "Trak-Sweeper" is hydraulically propelled with a "super low" working speed of approximately 10 ft. per minute and travel speeds up to 15 mph. With aluminum used wherever possible in its construction, the light weight of the machine does not disturb the surface of the track when operating between the jacking means and the tamper.

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